



LIGHTHOUSE
WORLDWIDE SOLUTIONS

Lighthouse Worldwide Solutions Master Presentation



R&D / Headquarters / Manufacturing



Medford, OR

- ★ Manufacturing
- ★ Service & Repair Center
- ★ Central Calibration Lab
- ★ RMA Center



Fremont, CA

- ★ R&D
- ★ Engineering
- ★ Pilot Production
- ★ Executive Management



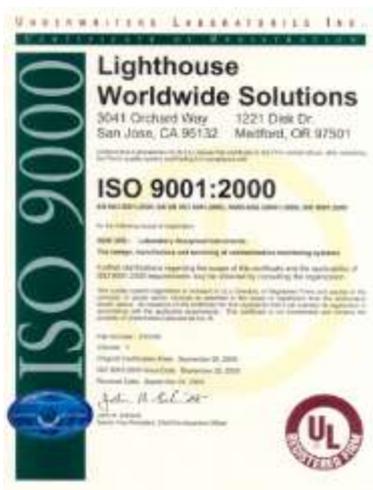
New Headquarters: **Silicon Valley**





Lighthouse Focus on Quality

ISO 9001:2000 Facilities



**United States:
Medford, OR
San Jose, CA**



**The Netherlands:
Alphen**



Singapore



Thailand

5 Lighthouse Locations are ISO 9000 Registered



Lighthouse Worldwide Solutions

★ **Pharmaceutical Capabilities:**

- ★ Particle counters and facility monitoring systems for meeting cGMP monitoring regulations
 - ★ 21 CFR Part 210 & 211
 - ★ 21 CFR Part 11
 - ★ EU GMP Annex 1
 - ★ PIC/S Annex 1
 - ★ WHO Guidelines
 - ★ USP 788/797
- ★ Systems designed for compliance
- ★ Project management services
- ★ Installation services
- ★ Validation services
- ★ Service, repair, retrofit of monitoring systems
- ★ Calibration per ISO 21501 standards
- ★ Contamination control consulting and training



Monitoring Solutions

General Monitoring

- ✓ Air Particle
- ✓ Liquid Particle
- ✓ Temperature
- ✓ Humidity
- ✓ Differential Pressure
- ✓ Electrostatic Charge
- ✓ Air Velocity
- ✓ TOC

Specific Applications

- ✓ Current on FFU's
- ✓ Chillers/Refrigerators
- ✓ Door Switches
- ✓ Oven Temp
- ✓ Dry Box Humidity
- ✓ Gas Purity
- ✓ Incubators
- ✓ Large LCD Displays



Lighthouse Systems Experience

- ★ **Lighthouse experience in FMS system installation, particle counter integration and software**
- ★ **Over 200 FMS system installations worldwide**
- ★ **Lighthouse is the number one shipper of remote particle counters (numbers exceeding 900 units / month)**



Pharmaceutical Customers





Lighthouse Pharma Customers (System)

Large multi-building Pharma system which consists of particles counters and environmental sensors. These sensors are integrated to the FMS software with alarm beacons.

- ★ **Baxter System**
- ★ **ROCHE**
- ★ **Sandoz**
- ★ **Bimagen**
- ★ **Beta Plus Pharma**
- ★ **Budelpack NV**
- ★ **Galapagos NV**
- ★ **Helvoet Pharma Belgium NV**
- ★ **Mediline NV**
- ★ **Salvamed**
- ★ **Novo Nordisk**
- ★ **Styker Howmedica –system**
- ★ **West Pharmaceuticals**
- ★ **Hospira / Abbott**
- ★ **GE Healthcare – system**
- ★ **Kabi Fresenius**
- ★ **Biogalenica**
- ★ **Favea**
- ★ **Vericore**
- ★ **Jugoremedia**
- ★ **Octapharma**
- ★ **Q- Med**
- ★ **Alcomed BV**



Lighthouse Pharma Customers (System) – Cont'd

- ★ **Crucell**
- ★ **Dutch Veterian Institute**
- ★ **Fresenius Hemocare BV**
- ★ **Mallinckodt Medical/ Tyco**
- ★ **Microclean B.V**
- ★ **Nelipak / Seal Air**
- ★ **Sandoz**
- ★ **Schenker International**
- ★ **TNO –Dimes**
- ★ **ACE Pharmaceuticals**
- ★ **Allergy Therapeutics – system**
- ★ **Aston University (Mayne-Parma)**
- ★ **Astra Zeneca – system**
- ★ **Baxter system**
- ★ **Glan Clywdd Hospital**
- ★ **Medtronic**
- ★ **Glaxo Smith Kline – system**
- ★ **NIBSC Stem Cell Bank**
- ★ **Pfizer-system**
- ★ **University College London system**
- ★ **Vericore (Novartis) –system**
- ★ **Astra Zeneca – system**
- ★ **Bassaire**
- ★ **IBA Molecular**
- ★ **Amgen**
- ★ **Chiron**
- ★ **Organogenesis**
- ★ **Pharmaforce**
- ★ **Cell Genesys**
- ★ **McGuff Pharma**
- ★ **MDS Nordion**



LIGHTHOUSE
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Technology That Counts



Software



LIGHTHOUSE
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Technology That Counts

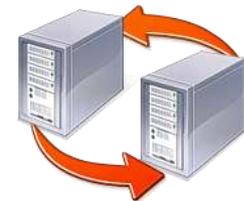


Easy to Use
Compliant



LMS Standard Software Capabilities

- **Designed for 21 CFR Part 11 compliance**
- **Full life cycle documentation per GAMP 5**
- **Real-time data collection**
- **Historical data review**
- **Multi level maps**
- **Reports**
- **Thin Client data access (depending on package)**
- **Complete failover solutions (depending on package)**
- **Supports user administration via MS Windows domain**





21 CFR Part 11 Compliance

Software Security

- ★ Unique name
- ★ Unique password
- ★ Password aging
- ★ Auto logout
- ★ Inactivity logout
- ★ Failed logon
- ★ Encrypted database

| Identification | User Methods | General | Security | Configuration ViewStation | Contact Information |
|---|--------------|-------------------------------------|------------|---------------------------|---------------------|
| Enabled <input checked="" type="checkbox"/> | | | | | |
| Minimum Password Length | | 6 | Characters | | |
| Minimum Password Strength | | Very Strong | | | |
| Allowed Failed Logons | | 5 | | | |
| Password Dictionary Size | | 0 | | | |
| Must Have Password | | <input checked="" type="checkbox"/> | | | |
| Can Change Password | | <input checked="" type="checkbox"/> | | | |
| Password Expires After | | 0 | | ... | |
| Inactivity Logout | | 4H | | ... | |



Example of Facility Map

A screenshot of the LMS Express 2006 RT software interface. The window title is "LMS Express 2006 RT". The menu bar includes "File", "Edit", "View", and "Help". The address bar shows the path "> Home > Maps > Bob Smith: Facility Map". On the left, there is a "Task Panel" with a "Navigation Panel" on its side. The "Tasks" section includes: "Create a New Map", "Change Map Settings", "Delete this Map", "Save to Image File", and "Print this Map". The "Details" section shows: "Facility Map", "Access: Private", and "Owner: Bob Smith". The main area displays a 3D perspective view of a facility room labeled "Bob Smith: Facility Map". The room contains a "Facility Camera" on the left wall. Several sensors are indicated with colored icons and labels: a red icon for "REMOTE 3014P Location 001", a red icon for "0.3 micron 11847 (Counts)", a yellow icon for "Temperature 74.7 (F)", a blue icon for "Relative Humidity 50.5 (%)", and a yellow icon for "REMOTE LPC 0.2 Location 002". At the bottom of the window, there is a status bar with "Administrator" on the left, and two red buttons on the right: "Unacknowledged Alarms Exist" and "Alarm".

★ Unique map for each building or room

★ Changes state based upon condition
-normal
-alarm
-warning
-fault

★ Supports internet cameras

★ Icons for each type of sensor



Example of Real-time Screen Grid

LMS Express 2006 RT

File Edit View Help

Back Home [Icons] > Home > Real-Time Status Options > Real-Time Data Status

Real-Time Data Status

View Mode: Grid

| | | | | |
|---|---|--|--|--|
| REMOTE 3014P Gowning 0.3 micron (Counts) 11594 (Counts) | REMOTE 3014P Gowning 0.3 micron (Normalized) 231880.0 (pft ³) | REMOTE 3014P Gowning 0.5 micron (Counts) 1204 (Counts) | REMOTE 3014P Gowning 0.5 micron (Normalized) 24080.0 (pft ³) | REMOTE 3014P Gowning 1.0 micron (Counts) 271 (Counts) |
| REMOTE 3014P Gowning 1.0 micron (Normalized) 5420.0 (pft ³) | REMOTE 3014P Gowning 3.0 micron (Counts) 14 (Counts) | REMOTE 3014P Gowning 3.0 micron (Normalized) 280.0 (pft ³) | REMOTE 3014P Gowning Sample Time 30 (s) | REMOTE 3014P Gowning Sample Volume 0.1 (ft ³) |
| REMOTE LPC 0.2 Wash Area 0.3 micron (Counts) 101 (Counts) | REMOTE LPC 0.2 Wash Area 0.3 micron (Normalized) 2.5 (p/ml) | REMOTE LPC 0.2 Wash Area 0.5 micron (Counts) 22 (Counts) | REMOTE LPC 0.2 Wash Area 0.5 micron (Normalized) 0.6 (p/ml) | REMOTE LPC 0.2 Wash Area 1.0 micron (Counts) 19 (Counts) |
| REMOTE LPC 0.2 Wash Area 1.0 micron (Normalized) 0.5 (p/ml) | REMOTE LPC 0.2 Wash Area 10.0 micron (Counts) 1 (Counts) | REMOTE LPC 0.2 Wash Area 10.0 micron (Normalized) 0.0 (p/ml) | REMOTE LPC 0.2 Wash Area Analog 1 Temperature 75.2 (F) | REMOTE LPC 0.2 Wash Area Analog 2 Relative Humidity 50.2 (%) |
| REMOTE LPC 0.2 Wash Area Calibration Reference 100.0 (%) | REMOTE LPC 0.2 Wash Area Sample Time 30 (s) | | | |

Bob Smith

Unacknowledged Alarms Exist Alarm

★ Multiple views

★ Grid view

★ View sensor data
In real-time

★ Status displayed
in color

★ Green = OK

★ Red = Alarm

★ Yellow = Warning

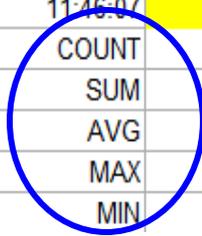
★ Blue = Fault



Data Charts

| | | | |
|---------------|---|-------------------------|-------------------------|
| Date Range: | 2009-02-20 11:37:04 - 2009-02-20 11:47:04 | | |
| Duration: | 0 hours, 10 minutes | | |
| Date Printed: | 2009-02-20 11:47:13 | | |
| | | | |
| DATE | TIME | LwsMacro_Cycle000_Value | LwsMacro_Cycle001_Value |
| 02/20/2009 | 11:37:05 | 1452.870 | 1121.750 |
| 02/20/2009 | 11:38:09 | 1254.260 | 1311.410 |
| 02/20/2009 | 11:39:05 | 1384.640 | 1315.580 |
| 02/20/2009 | 11:40:05 | 212.632 | 249.190 |
| 02/20/2009 | 11:41:07 | 350.871 | 254.967 |
| 02/20/2009 | 11:42:07 | 279.925 | 252.641 |
| 02/20/2009 | 11:43:07 | 790.005 | 777.462 |
| 02/20/2009 | 11:44:07 | 633.949 | 858.654 |
| 02/20/2009 | 11:45:07 | 784.448 | 612.003 |
| 02/20/2009 | 11:46:07 | 1287.470 | 1498.710 |
| | COUNT | 10 | 10 |
| | SUM | 8431.070 | 8252.367 |
| | AVG | 843.107 | 825.237 |
| | MAX | 1452.870 | 1498.710 |
| | MIN | 212.632 | 249.190 |

- ★ Copy and paste
- ★ Color status
- ★ User defined status
- ★ Selectable duration
- ★ Rolling charts
- ★ Statistics
 - ★ Count
 - ★ Sum
 - ★ Avg
 - ★ Max
 - ★ Min



Reports

NEC Empowered by Innovation

NEC Sensor Alarm & Conformance Report

09/29/2004 09/30/2004
12:59:32 to 12:59:32

Sensor Description Count Minimum Average Alarm Count

Average Data Per Point

| Sensor | Description | Count | Minimum | Average | Alarm Count |
|---------|----------------------|-------|---------|---------|-------------|
| AT-012 | [SIM] T012: SIU TEMP | 0 | 0 | 0.000 | 0 |
| AT-013 | [SIM] T013: SIU TEMP | 0 | 0 | 0.000 | 0 |
| BT-015 | [SIM] T015: SIU TEMP | 0 | 0 | 0.000 | 0 |
| CH102AL | Port 1 0.2 Alarm | 0 | 0 | 0.000 | 0 |
| CT-004 | [SIM] T004: SIU TEMP | 0 | 0 | 0.000 | 0 |
| CT-005 | [SIM] T005: SIU TEMP | 0 | 0 | 0.000 | 0 |
| CT-016 | [SIM] T016: SIU TEMP | 0 | 0 | 0.000 | 0 |
| CT-017 | [SIM] T017: SIU TEMP | 0 | 0 | 0.000 | 0 |
| DT-006 | [SIM] T006: SIU TEMP | 0 | 0 | 0.000 | 0 |
| DT-007 | [SIM] T007: SIU TEMP | 0 | 0 | 0.000 | 0 |
| DT-018 | [SIM] T018: SIU TEMP | 0 | 0 | 0.000 | 0 |
| DT-019 | [SIM] T019: SIU TEMP | 0 | 0 | 0.000 | 0 |
| EH-020 | [SIM] H020: SIU HUM | 0 | 0 | 0.000 | 0 |

★ Customizable

★ Summary of data

★ User defined

★ Std reports available



Sensor Alarm Report

Date Range: 12/06/05 - 12/07/05
Time Range: 18:34:00 - 18:34:00
Duration: 24 hrs

| Name | Description | Count | Average | Std Dev | Alarm Count | % Alarm | % Conformance |
|-------|------------------------|-------|---------|---------|-------------|---------|---------------|
| 237H | M1 - Room Humidity | 16 | .00 | .00 | 16 | 100.00 | .00 |
| 237P | M1 - Particle Count | 16 | 101.66 | 309.99 | 2 | 12.50 | 87.50 |
| 237T | M1 - Temperature | 16 | .00 | .00 | 16 | 100.00 | .00 |
| 4700 | 4700 Particle Count | 0 | .00 | .00 | 0 | .00 | .00 |
| D07 | D07 PHOTO BAY | 0 | .00 | .00 | 0 | .00 | .00 |
| D08 | D08 DIFFUSION BA | 0 | .00 | .00 | 0 | .00 | .00 |
| D10 | D10 FURNACE | 0 | .00 | .00 | 0 | .00 | .00 |
| D15 | D15 WET BENCH | 0 | .00 | .00 | 0 | .00 | .00 |
| DP | Differential Pressure | 0 | .00 | .00 | 0 | .00 | .00 |
| DP1 | SIU - Differential Pre | 1 | 4.37 | .00 | 0 | .00 | 100.00 |
| D1M01 | Dutec Temperature I | 200 | 74.54 | 2.00 | 10 | 3.30 | 96.64 |
| D1M02 | Dutec Temperature I | 200 | 74.30 | 1.16 | 1 | .30 | 99.66 |



Email Alarming

Choose a single person or group of people

Notification Setup

Name: Bob Jones Owner: hollyc

Notes: Contamination Control Department, Bob Jones

Output | Sensors | Schedule | Verification

Email IAP Consolidate Output

Address1: BJones@test.com
Address2:
Address3:
SMTP Server:

Msg Format: LMS MSG: %d %e %s %v %n Enable

Save Delete Close

Notification Setup

Name: Bob Jones Owner: hollyc

Notes: Contamination Control Department, Bob Jones

Output | Sensors | Schedule | Verification

| Sensor | Event | Msg Note | |
|--|---------|-----------------|---------|
| <input checked="" type="checkbox"/> 2CALC007 | STALE | call mgr | Add |
| <input checked="" type="checkbox"/> 2CALC008 | WARNING | | Modify |
| <input checked="" type="checkbox"/> 2CALC008 | FAULT | | Remove |
| <input checked="" type="checkbox"/> 2CALC014 | STALE | | |
| <input checked="" type="checkbox"/> 2CALC015 | ALARM | call facilities | |
| <input checked="" type="checkbox"/> 2CALC007 | ALARM | shut off equip | Dcps... |

Select and double click (or click modify) to update a sensor

Msg Format: LMS MSG: %d %e %s %v %n Enable

Save Delete Close

User can choose what status will trigger the alarm.



Main Screen



Main Facility



Log Off

Map

List

Grid

Trends

Reports

Alarms

Events

Process



Home
Up

Time Range to Display

Start:

End:

Data to Display

- Particle
- Diff. Pressure
- Environmental
- Viable
- Other



Error

Stale

Alarm

Calibration Alarm

Fault

Warning

Calibration Warning

Normal

Uninitialized

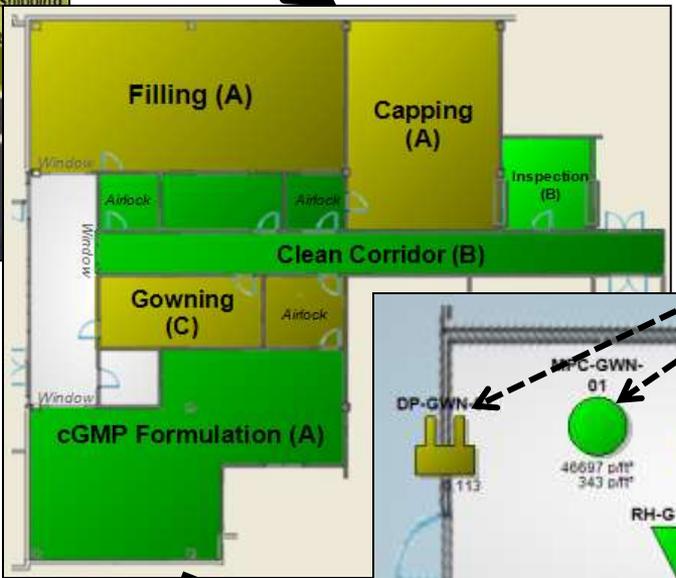
Disabled

Alarms Disabled

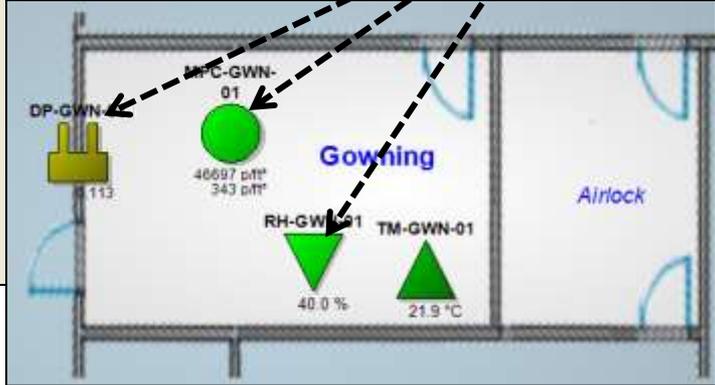
www.golighthouse.com



Multi-level Maps



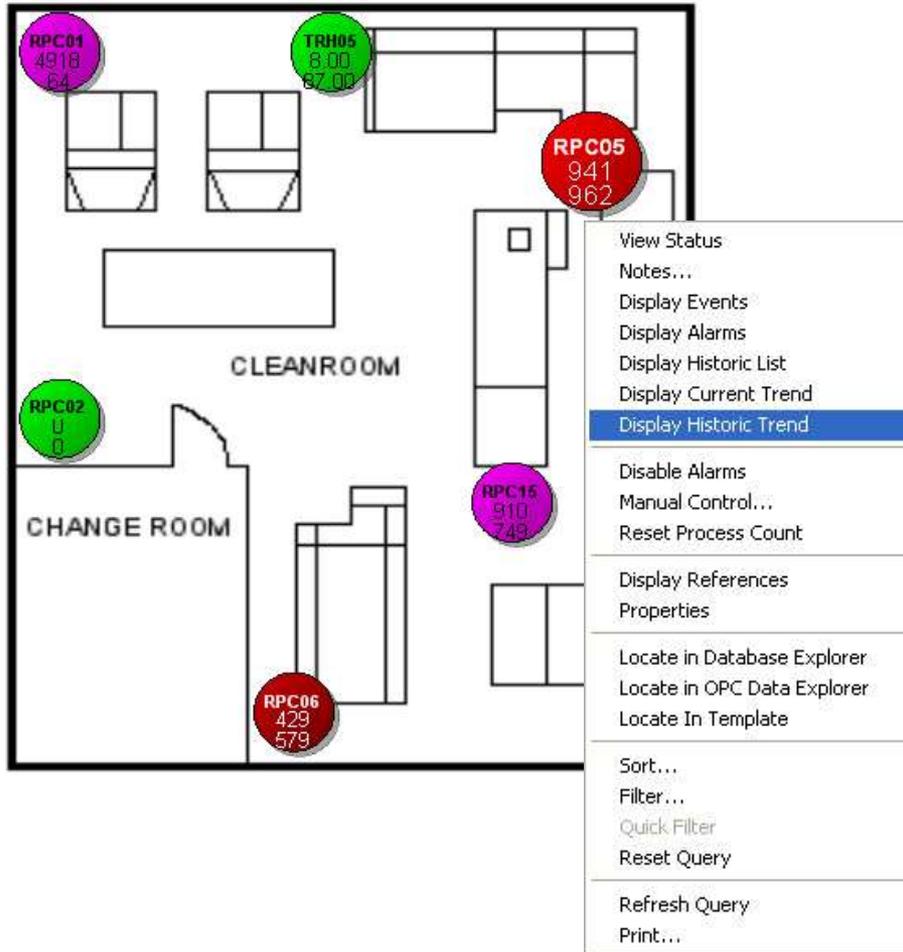
Unique sensor shapes



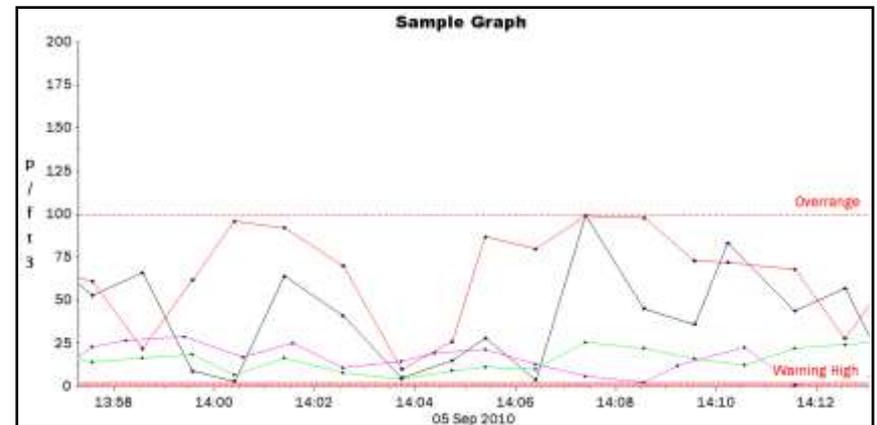
Drill-down maps allow you to see an overview of the facility and then status of a specific room



From Map to Graph



Simple mouse click navigation to the data you want to see...





List Screen

View All Sensors Status

★ Real Time Color Status

★ Real Time Data Status

★ Location Name

★ Values

★ Date and Time

★ Sort by Status

| Map | List | Grid | Trends | Reports |
|-----------------|------------|--------------------------|--------|---------|
| Point | Value | Timestamp | | |
| DP-LBL-01 | 0.150 "H2O | 4/30/2011 5:18:36.705 PM | | |
| RH-SHIP-01 | 41.3 % | 4/30/2011 5:18:36.505 PM | | |
| TM-GWN-01 | 23.1 °C | 4/30/2011 5:18:36.505 PM | | |
| DP-GWN-01 | 0.113 "H2O | 4/30/2011 5:18:36.505 PM | | |
| DP-PREP-01 | 0.050 "H2O | 4/30/2011 5:18:36.495 PM | | |
| TM- | | | | |
| DP-CAP-01 | 0.050 " | | | |
| RPC-FRM-02 0.5 | 71 | | | |
| Test1 | 48 | | | |
| MPC-GWN-01 0.5 | 47022 | | | |
| MPC-PREP-01 0.5 | 42977 | | | |
| RH-CAP-01 | 40 | | | |
| RH-SHIP-02 | 40 | | | |
| RH-STOR-01 | 40.0 % | 4/30/2011 5:18:36.005 PM | | |
| RH-CORR-01 | 37.5 % | 4/30/2011 5:18:36.005 PM | | |
| RH-FILL-01 | 37.5 % | 4/30/2011 5:18:36.005 PM | | |
| RH-GWN-01 | 37.5 % | 4/30/2011 5:18:36.005 PM | | |

Click n Go



Acknowledge an alarm

Display a trend

Disable / enable alarms

Configure

Locate a sensor

DP-PREP-01

Acknowledge Alarms

Display...

Trends...

Disable Alarms

Enable Alarms

Configure...

Locate...



SPC

★ SPC calculations

- ★ Min
- ★ Max
- ★ Average
- ★ Standard deviation
- ★ X-Bar
- ★ R-Bar

★ Modifiable parameters

- ★ Sigma
- ★ Warning count
- ★ Alarm count
- ★ Sample group size

Calculation: **Mean**

Calculation:

Calculation:

- C-Chart
- Lower Control Limit (LCL)
- Lower Warning Limit
- Mean**
- P-Chart
- Standard Deviation (Sigma)
- Summation
- Upper Control Limit (UCL)
- Upper Warning Limit
- Variance
- Process Cp
- Process CpL
- Process CpU
- Process Cpk
- Process CR

Drop down selection menu

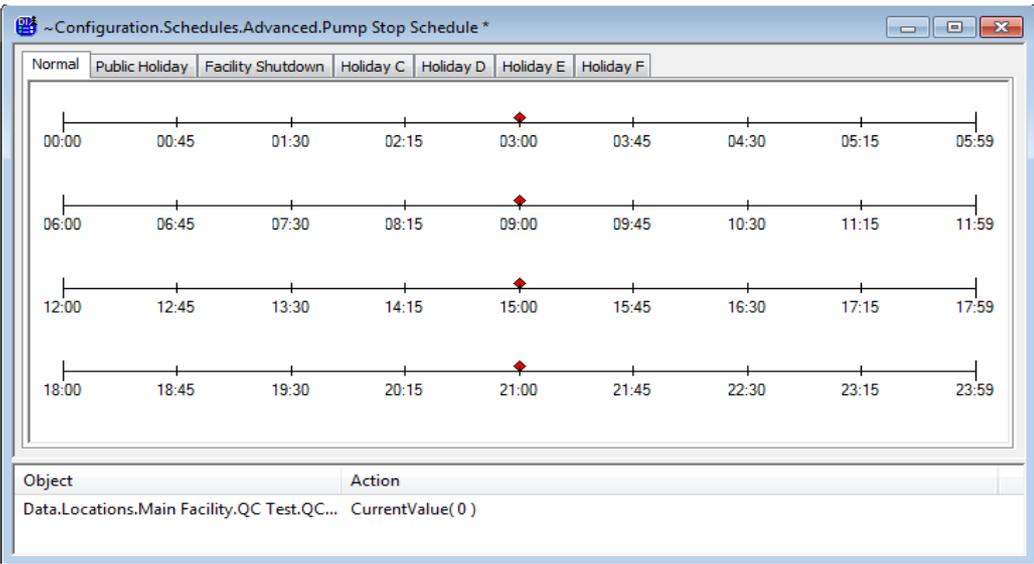
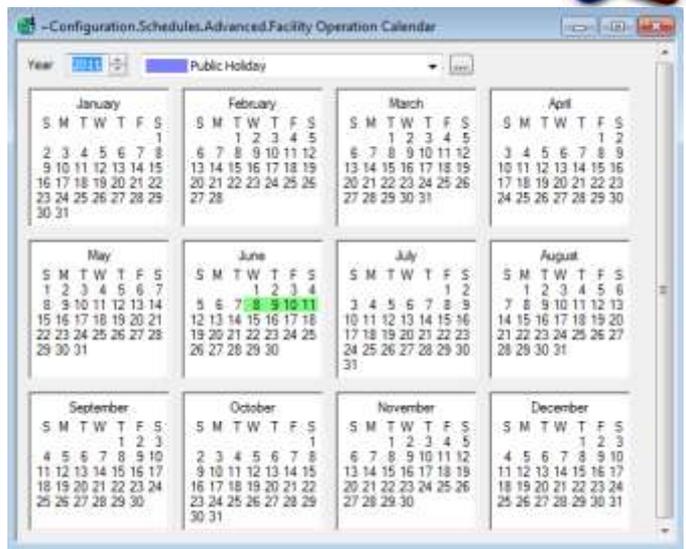




Schedules

★ Setup a scheduled event based on date and time.

- ★ Turn on / off a pump
- ★ Automatically change alarm limits
- ★ Trigger sampling recipes
- ★ Print reports
- ★ Stop recording data





Status Screen

View all sensors status

★ Real-time color status

★ Real-time data status

★ Location name

★ Values

★ Date and time

★ Current / historical graphs

★ Alarm acknowledgment

| Map | List | Grid | Trends | Reports | Events | Process |
|--|--|--|--|---|--------|---------|
| RPC01 4918 CH 0.5μ 64 CH 5.0μ 7/16/2010 3:09:39.379 PM | RPC02 0 CH 0.5μ 0 CH 5.0μ 7/19/2010 7:22:59.421 PM | RPC05 522 CH 0.3μ 718 CH 0.5μ 7/25/2010 8:56:03.968 PM | RPC06 184 CH 0.3μ 160 CH 0.5μ 7/25/2010 8:56:03.968 PM | RPC07 367 p/ft ³ 858 p/ft ³ 7/25/2010 8:56:03.999 PM | | |
| RPC08 1334 p/ft ³ 496 p/ft ³ 7/25/2010 8:56:03.999 PM | RPC09 801 p/ft ³ 1075 p/ft ³ 7/25/2010 8:56:13.999 PM | RPC10 268 p/ft ³ 1272 p/ft ³ 7/25/2010 8:56:14.030 PM | RPC11 1234 p/ft ³ 910 p/ft ³ 7/25/2010 8:56:14.030 PM | RPC12 701 p/ft ³ 548 p/ft ³ 7/25/2010 8:56:14.030 PM | | |
| RPC13 168 p/ft ³ 186 p/ft ³ 7/25/2010 8:56:14.030 PM | RPC14 1251 p/ft ³ 884 p/ft ³ 7/25/2010 8:56:04.062 PM | TRH05 66.00 °C 48.00 % 7/25/2010 8:56:05.077 P | | | | |

- Acknowledge Alarms
- Display...
- Trends...
- Disable Alarms
- Enable Alarms
- Configure...
- Locate...

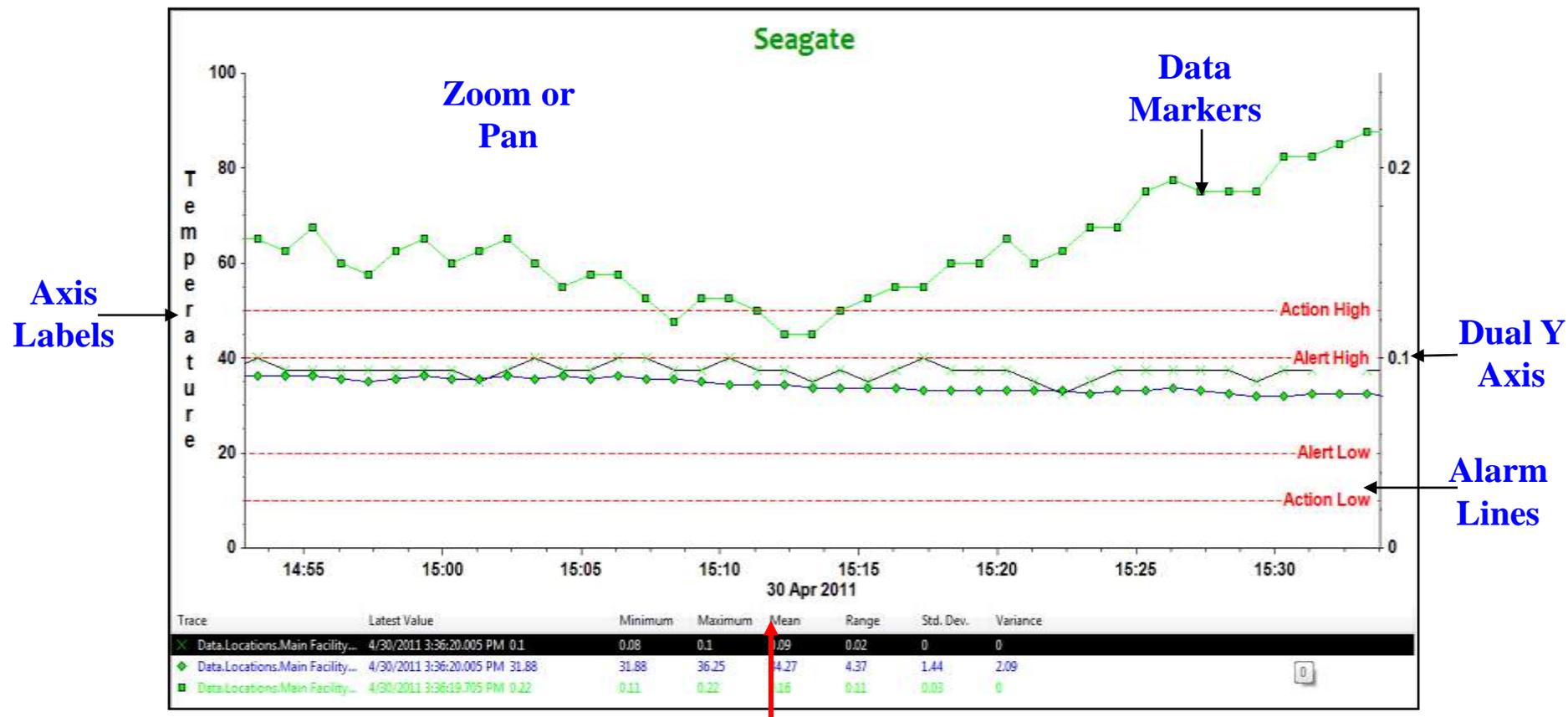
Mouse click menu selection simplifies use...

Click n Go





Graphs: Simplified Functionality



Rolling Statistics: Min, Max, Mean, Range, Std. Dev. and Variance



Calibration Tracking

- ★ Calibration dates are tracked in the system
- ★ Users are notified when a date is coming due

Calibration Dates

| Device | Calibration Due | Warning | Alarm | Due in |
|----------------|-----------------|---------|-------|--------|
| DP-CAP-01 | 01/31/2012 | 30 | 10 | 282 |
| DP-CAP-02 | 01/31/2012 | 60 | 20 | 282 |
| DP-CORR-01 | 12/29/1899 | 60 | 15 | 0 |
| DP-CORR-02 | 12/29/1899 | 60 | 15 | 0 |
| DP-CORR-03 | 12/29/1899 | 30 | 1 | 0 |
| DP-FILL-01A | 01/31/2012 | 30 | 1 | 282 |
| DP-FRM-01 | 01/31/2012 | 30 | 1 | 282 |
| DP-GWN-01 | 01/31/2012 | 30 | 1 | 282 |
| MPC-CORR-01 | 12/29/1899 | 30 | 1 | 0 |
| MPC-GWN-01 | 01/31/2012 | 30 | 1 | 282 |
| MPC-INSPECT-01 | 01/31/2012 | 30 | 1 | 282 |
| RH-CAP-01 | 01/31/2012 | 30 | 1 | 282 |
| RH-CORR-01 | 12/29/1899 | 30 | 1 | 0 |
| RH-FILL-01 | 01/31/2012 | 30 | 1 | 282 |
| RH-FRM-01 | 01/31/2012 | 30 | 1 | 282 |
| RH-GWN-01 | 01/31/2012 | 30 | 1 | 282 |
| RH-INSPECT-01 | 01/31/2012 | 30 | 1 | 282 |
| RPC-CAP-01 | 01/31/2012 | 30 | 1 | 282 |
| RPC-FILL-01 | 01/31/2012 | 30 | 1 | 282 |
| RPC-FILL-02 | 01/31/2012 | 30 | 1 | 282 |
| RPC-FRM-01 | 01/31/2012 | 30 | 1 | 282 |
| RPC-FRM-02 | 01/31/2012 | 30 | 1 | 282 |
| TM-CAP-01 | 01/31/2012 | 30 | 1 | 282 |
| TM-CORR-01 | 12/29/1899 | 30 | 1 | 0 |
| TM-FILL-01 | 01/31/2012 | 30 | 1 | 282 |
| TM-FRM-01 | 01/31/2012 | 30 | 1 | 282 |

Calibration Due Date

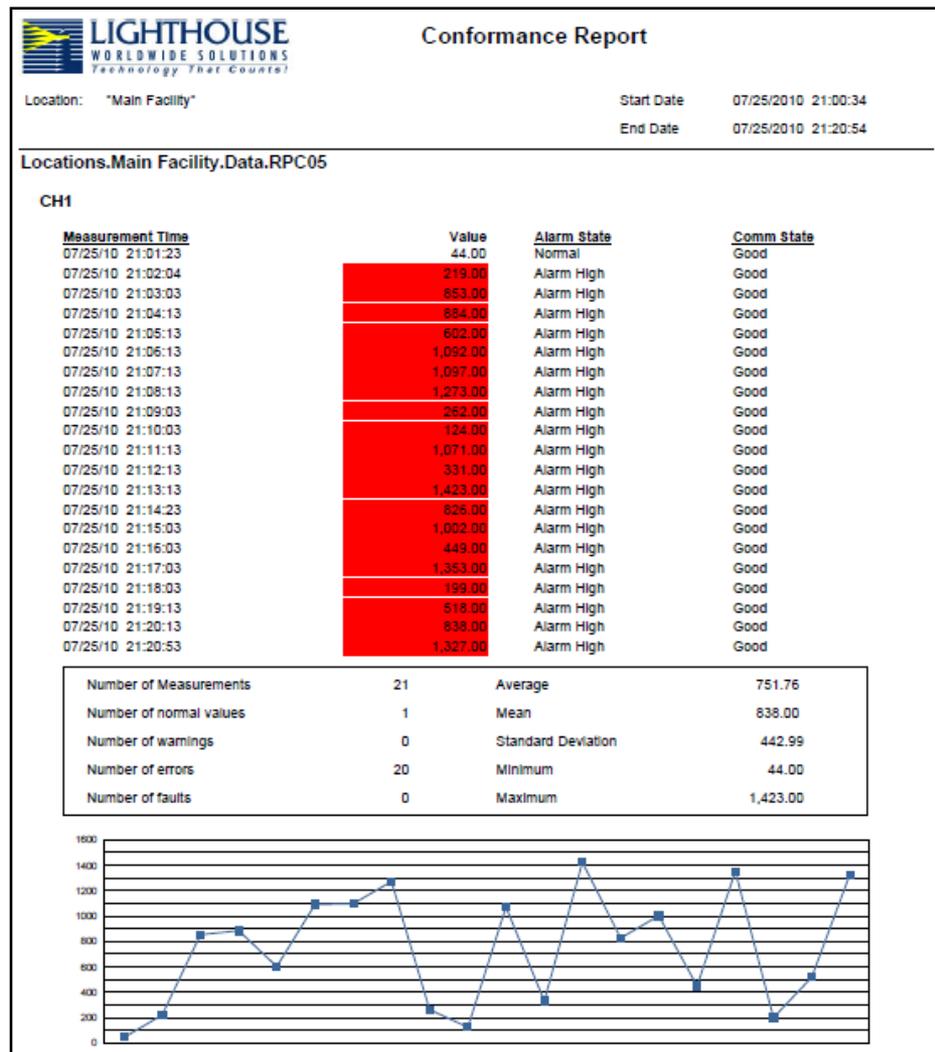
Cal Warning Days

Cal Alarm Days



Report Function

- ★ Conformance report
 - ★ Raw data by channel size
 - ★ Color-coded
 - ★ Summary of events
 - ★ # of Measurements
 - ★ # of Warnings
 - ★ # of Alarms
 - ★ Min
 - ★ Max
 - ★ Average
 - ★ Mean
 - ★ Standard deviation
 - ★ Graphs of selected points





LIGHTHOUSE
WORLDWIDE SOLUTIONS
Technology That Counts



Simplified Operation

Lighthouse has focused on simplifying system configuration and setup





Simplified Operation

★ The system incorporates several features that simplify configuration, reduce training requirements and reduce operator configuration errors.

★ Templates

★ Modules

★ Recipes



Templates

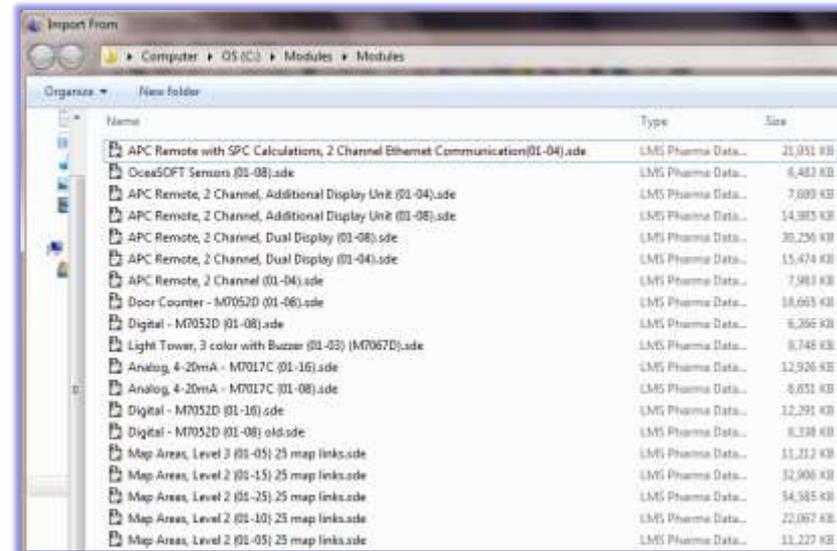
★ **Templates** – Templates allow us to specify which settings are common for all sensors (and the values for those settings), and which settings can be changed on a sensor-by-sensor basis.

For example, all particle counters have a minimum value of 0 and no specified maximum value, so in the particle counter template, those values are fixed.



Modules

- ★ A module is a pre-configured group of sensors that can be imported into the system.
- ★ Reduces configuration time.
- ★ Reduces user error.
- ★ Simplifies the adding of sensors.





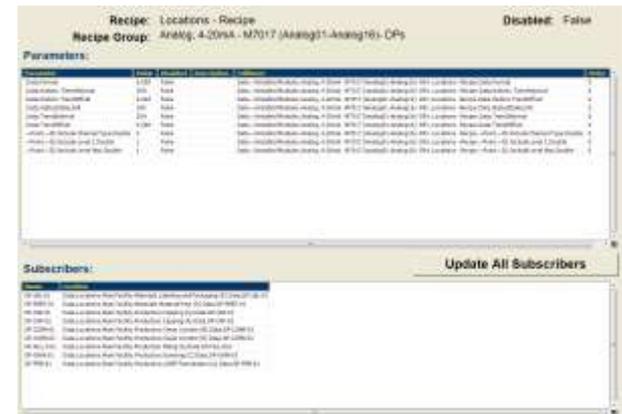
Recipes

★ Recipes allow us, for the settings which *can* be changed, to create groups of settings, and select for each sensor which group of settings to use.

For example, particle counters may be used in areas of different ISO classes, and in each ISO class, the alarm limits are different. Having a recipe for ISO class 5, another recipe for ISO class 6, and another recipe for ISO class 7 makes it easy to specify the alarm limits for different particle counters, without having to explicitly set the alarm limits for each sensor. If the alarm limit specification for a given area changes later, the values only need to be changed in the recipe, and all particle counters tied to that recipe will automatically reflect the change.

Recipe parameters

- Alarm limits
- Sample time
- Auto-trend intervals
- etc...



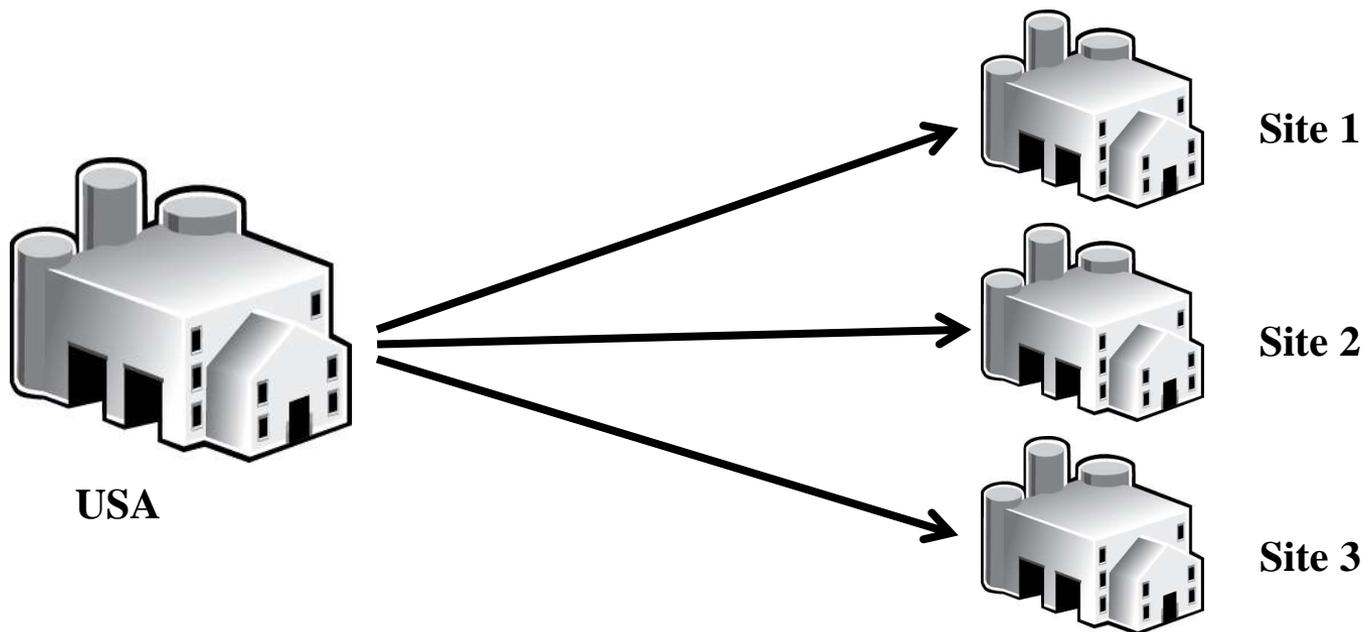


Simplified Deployment

★ Templates and Recipes allow for easy and consistent deployment of monitoring changes across multiple sites.

★ Export → e-mail → Import

★ Remote desktop





Alarming

The Lighthouse monitoring system alarm capabilities were designed with ultimate flexibility in mind.

Alarm Triggers

Each sensor can be setup to have four basic alarm triggers.



Conditional Alarming

LMS has a conditional alarming feature. This feature allows the user to customize alarm triggering conditions that match their process concerns. For example:

- ★ If a particle sample location is in alarm for a set amount of consecutive times then trigger an alarm.
- ★ We can alarm based on SPC rules.
- ★ We can vary alarm limits based on time and date.



Alarming

Alarm Notification

- ★ Light sticks (per room or central)
- ★ Buzzers
- ★ Text messages
- ★ E-mail alarm notification

Real-time viewing of alarms and warning conditions

- ★ Maps
- ★ Data tables
- ★ Reports
- ★ Grid view





Manual Data Input: Example

★ Input

- ★ Date
- ★ Time
- ★ Serial Number
- ★ Sample Location
- ★ Description
- ★ Calibration date
- ★ Individual channel size data

★ This can be used for any type of data.

- ★ Particle
- ★ Temperature/Humidity
- ★ Differential Pressure
- ★ Etc...

Manual Particle Counter Data Entry

Date and Time: 5/24/2010 2:04:10.893 PM
Serial Number: 081231042
Calibration Date: 9/1/2012 2:08:15.272 PM
Location: Room B301
Description: Handheld Particle Counter

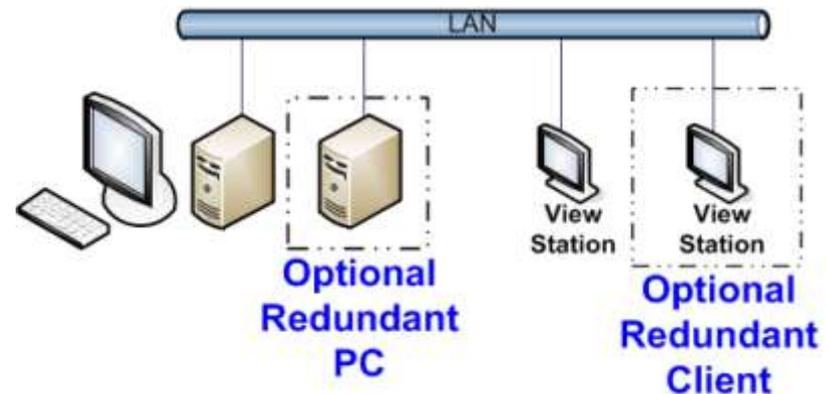
| Count Mode | CH / Density | Counts |
|------------|----------------|--------|
| Cumulative | CH1 0.3 μ | 15013 |
| | CH2 0.5 μ | 3001 |
| | CH3 1.0 μ | 103 |
| | CH4 3.0 μ | 40 |
| | CH5 5.0 μ | 12 |
| | CH6 10.0 μ | 2 |

Insert Record



Redundancy

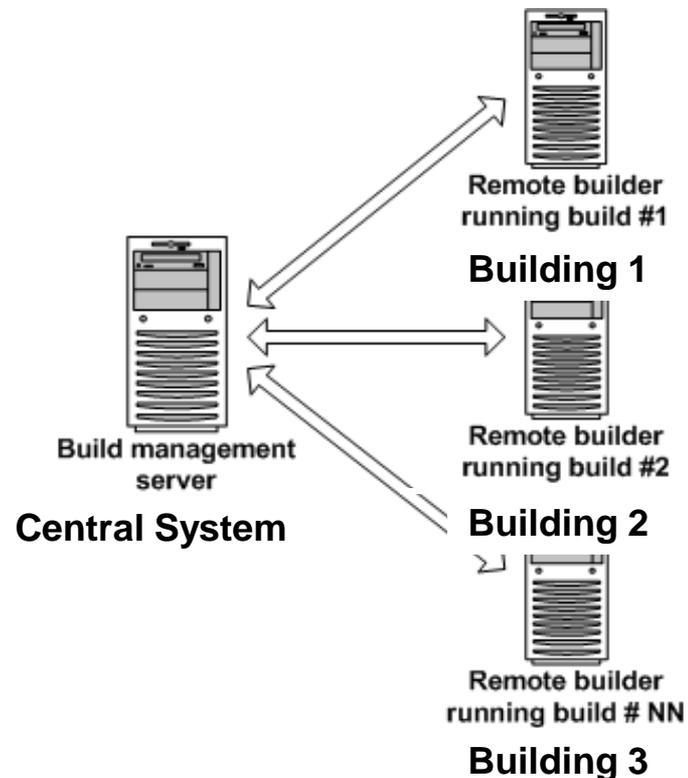
- ★ Redundant data acquisition (**failover**)
- ★ Redundant clients
- ★ Automatic recovery (**fail-back**)
 - ★ No loss of existing calculations, summations or processes
- ★ No operator intervention required
- ★ Mirrored historical data





Ultimate in Scalability

The Lighthouse Pharmaceutical Monitoring System is designed to scale from a single point to thousands of points and still maintain the same look and feel.

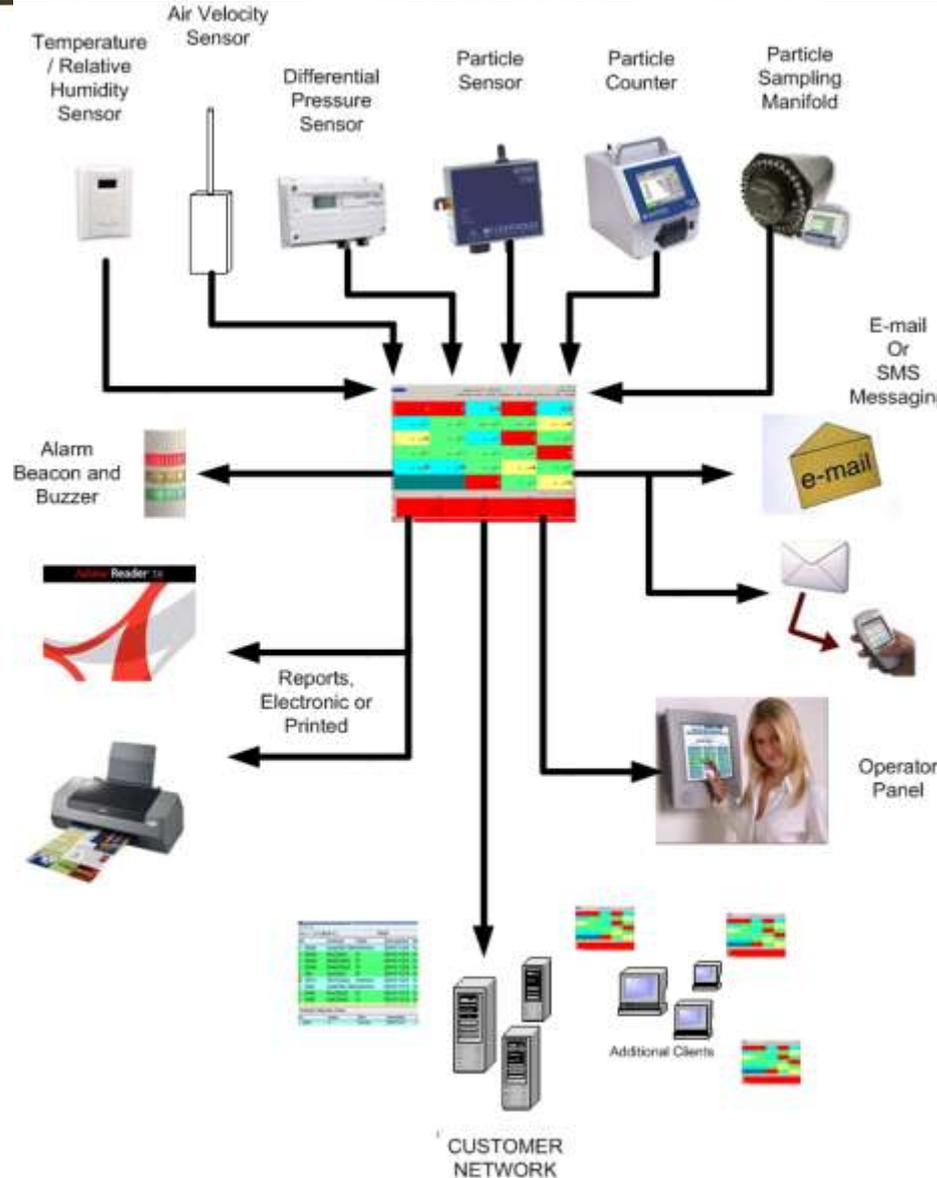




Connectivity

★ The Lighthouse Monitoring System is designed to meet all your monitoring needs.

- ★ Connectivity:
 - ★ 4 – 20 mA
 - ★ MODBUS
 - ★ Ethernet
 - ★ Digital input
 - ★ Digital output
 - ★ Thermocouple
 - ★ RTD

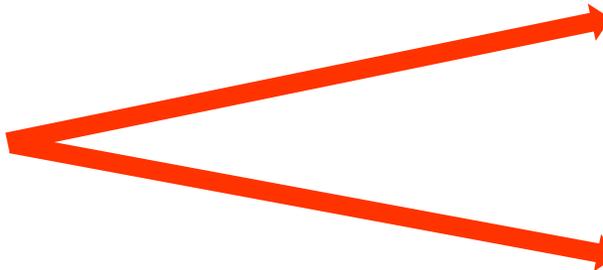




Connectivity

- ★ The Lighthouse Monitoring System can be can send and or receive data from other types of building automation, SCADA or control based systems.

- ★ Common interface between systems are:
 - ★ OPC
 - ★ MODBUS TCP or MODBUS ASCII
 - ★ Profibus
 - ★ Device Net





Summary

- ★ 64 Bit Architecture
- ★ Runs on Multiple Windows Platforms
- ★ Win 7, Server 2003, Server 2008, Win XP
- ★ Supports Virtual Machine (VMware)

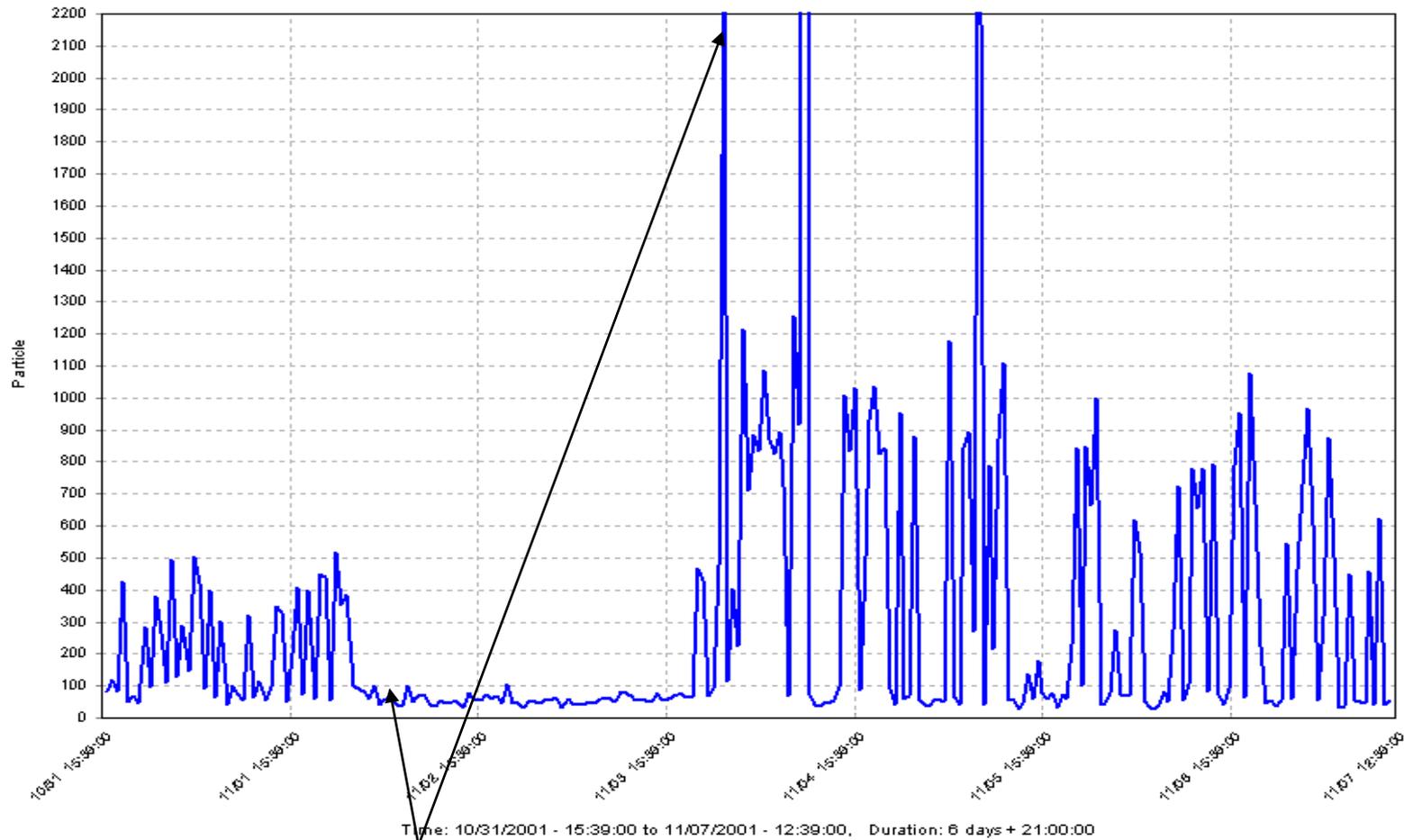




LIGHTHOUSE
WORLDWIDE SOLUTIONS
Technology That Counts



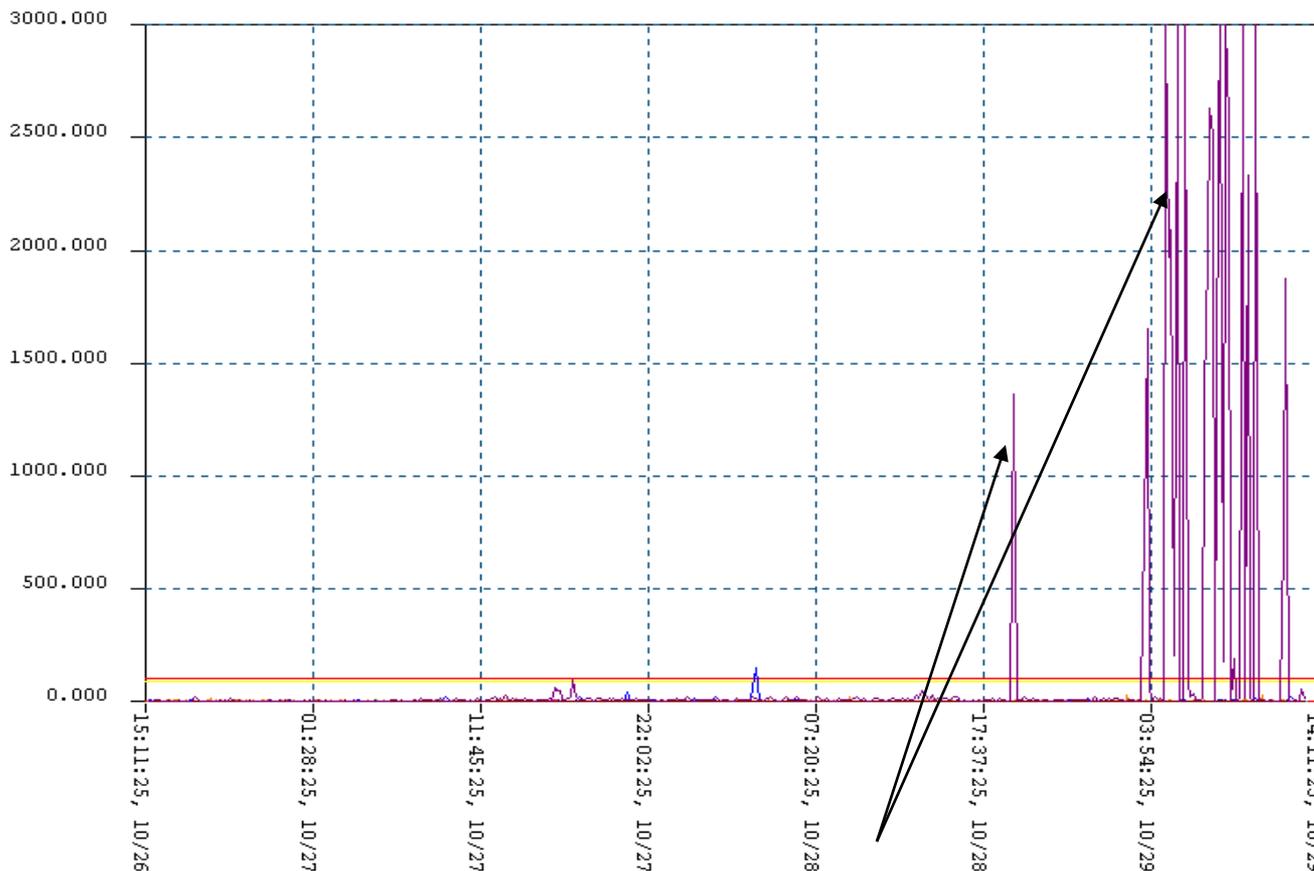
Problems Identified



Major shifts in particle concentration were identified using the Lighthouse Monitoring System



Parti-100@0.3, , 72:00 hrs, 10/26/2001-10/29/2001



<M212

<M501

<M203

<M404

<M419

<P701

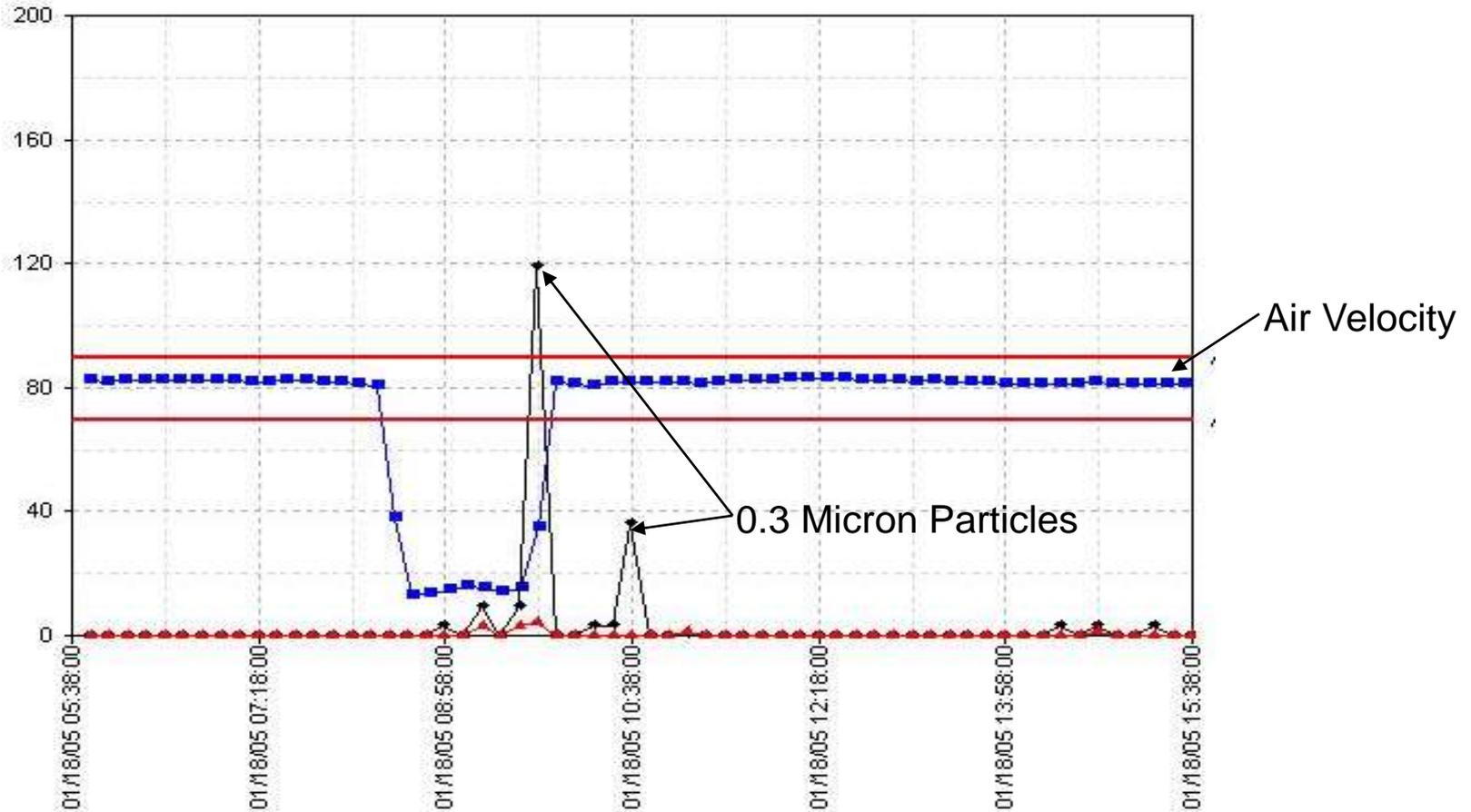
<M102

<P607

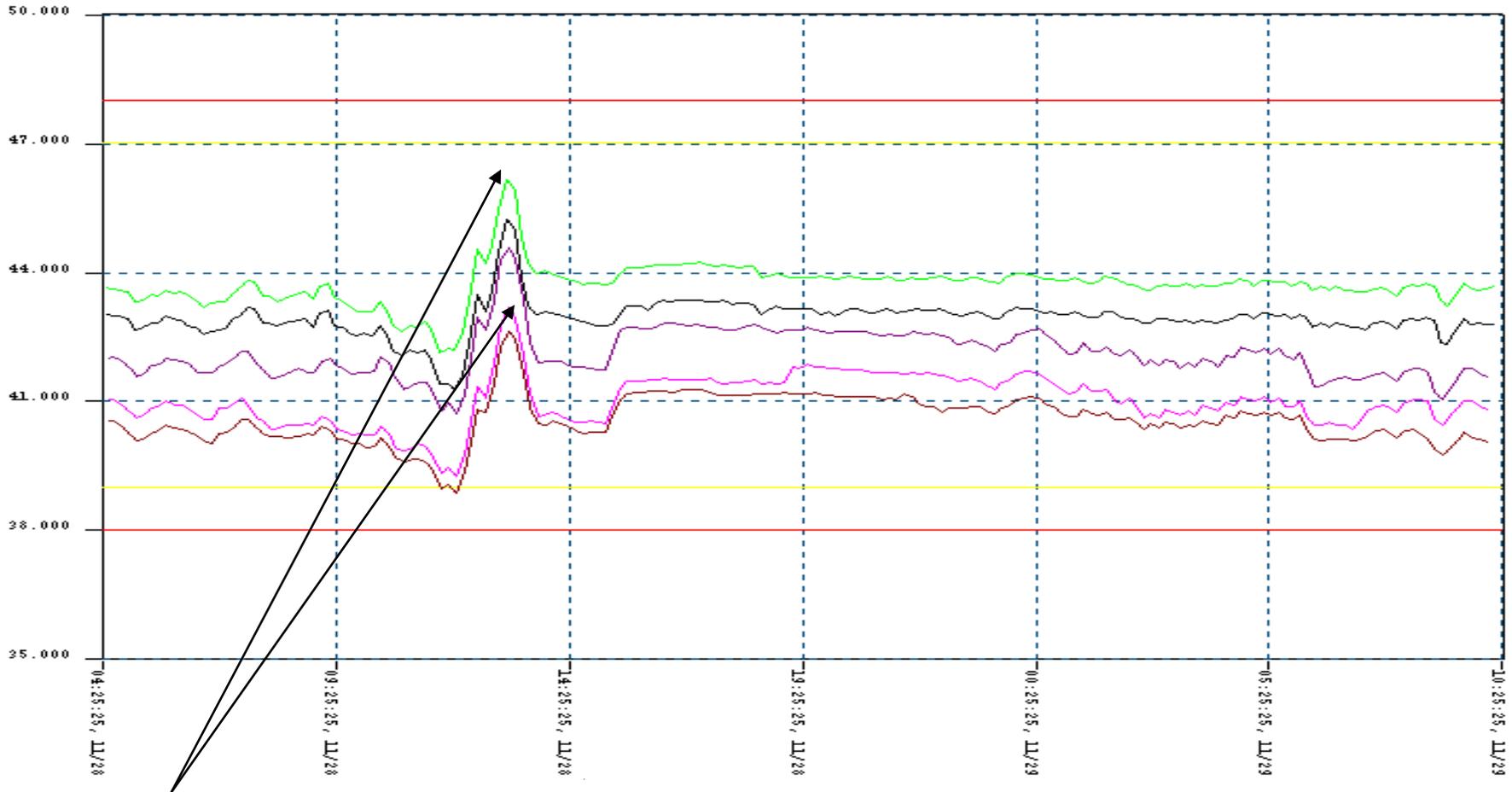
A pass through door was left open and allowed air from outside the cleanroom area to enter into a class 100 area. The issue was identified by the customer's Lighthouse System and then corrected



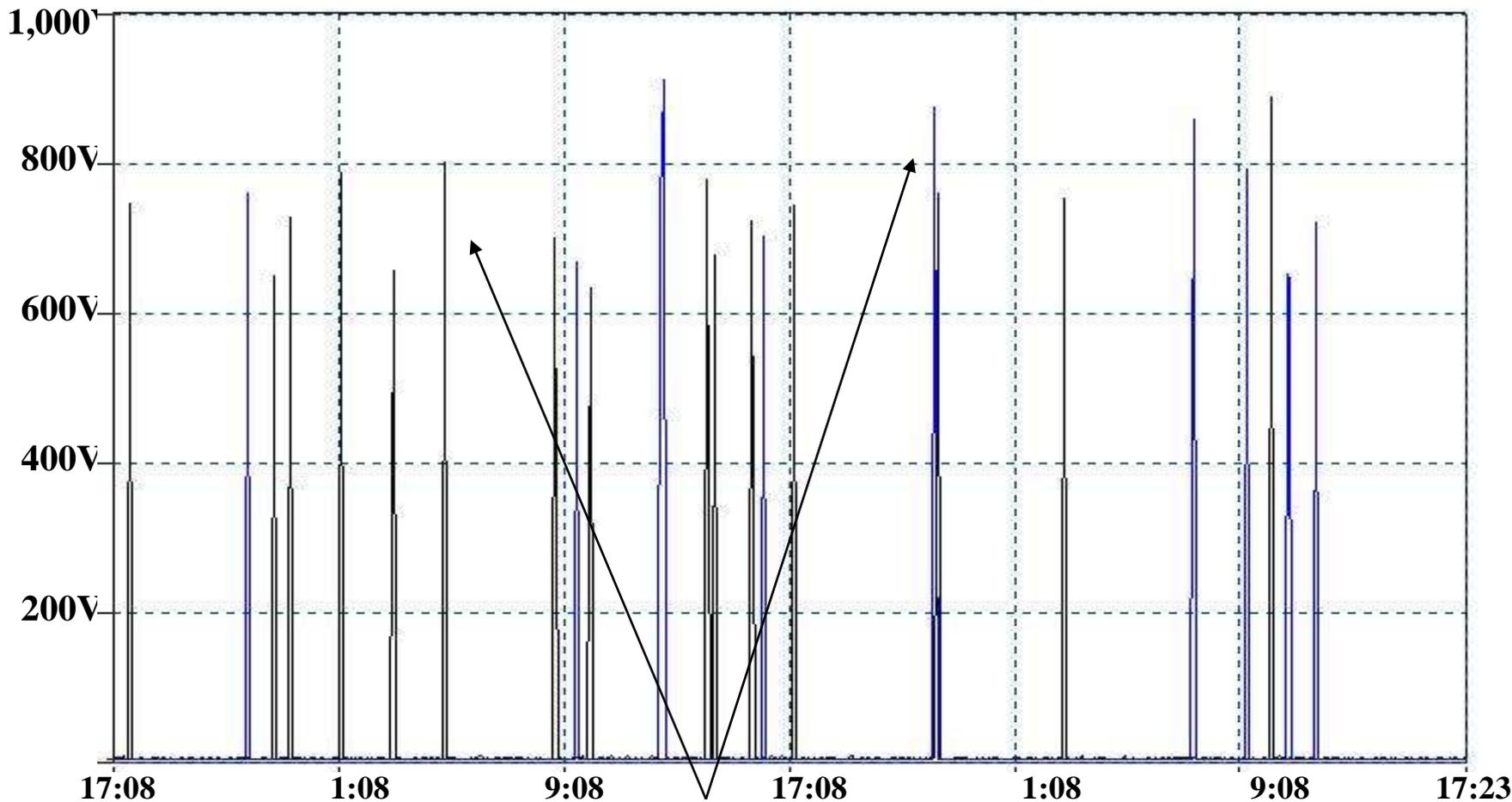
Air Velocity and Particle Data



A change in air velocity inside of this equipment had an effect on particle count concentration inside the equipment



The Humidity Control System was accidentally reset to increase the humidity levels in the cleanroom. Their Lighthouse system identified the problem and corrective action was taken

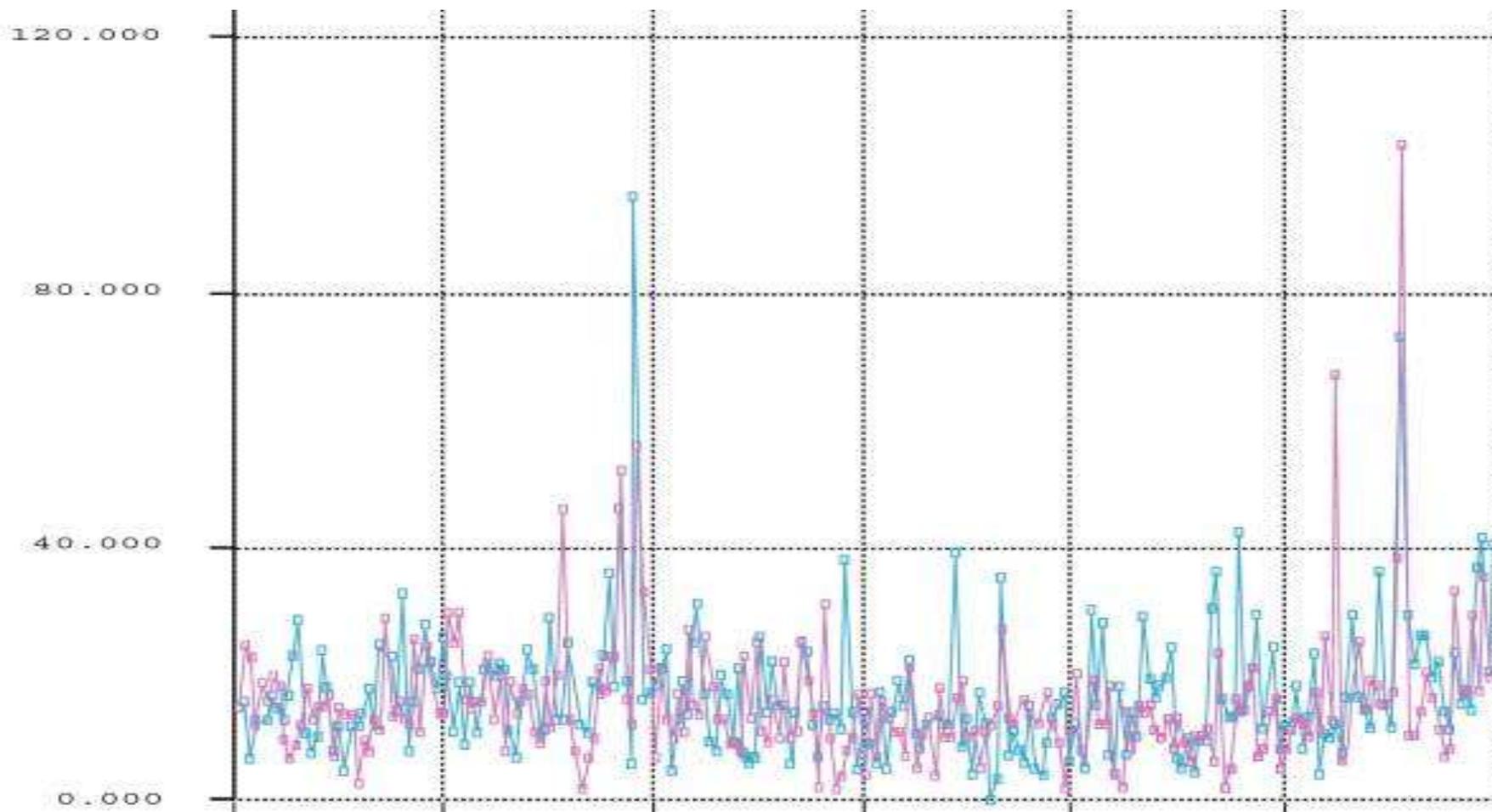


ESD Events were identified in two separate Steppers utilizing the Lighthouse ESD Monitoring System



Particle Count Data

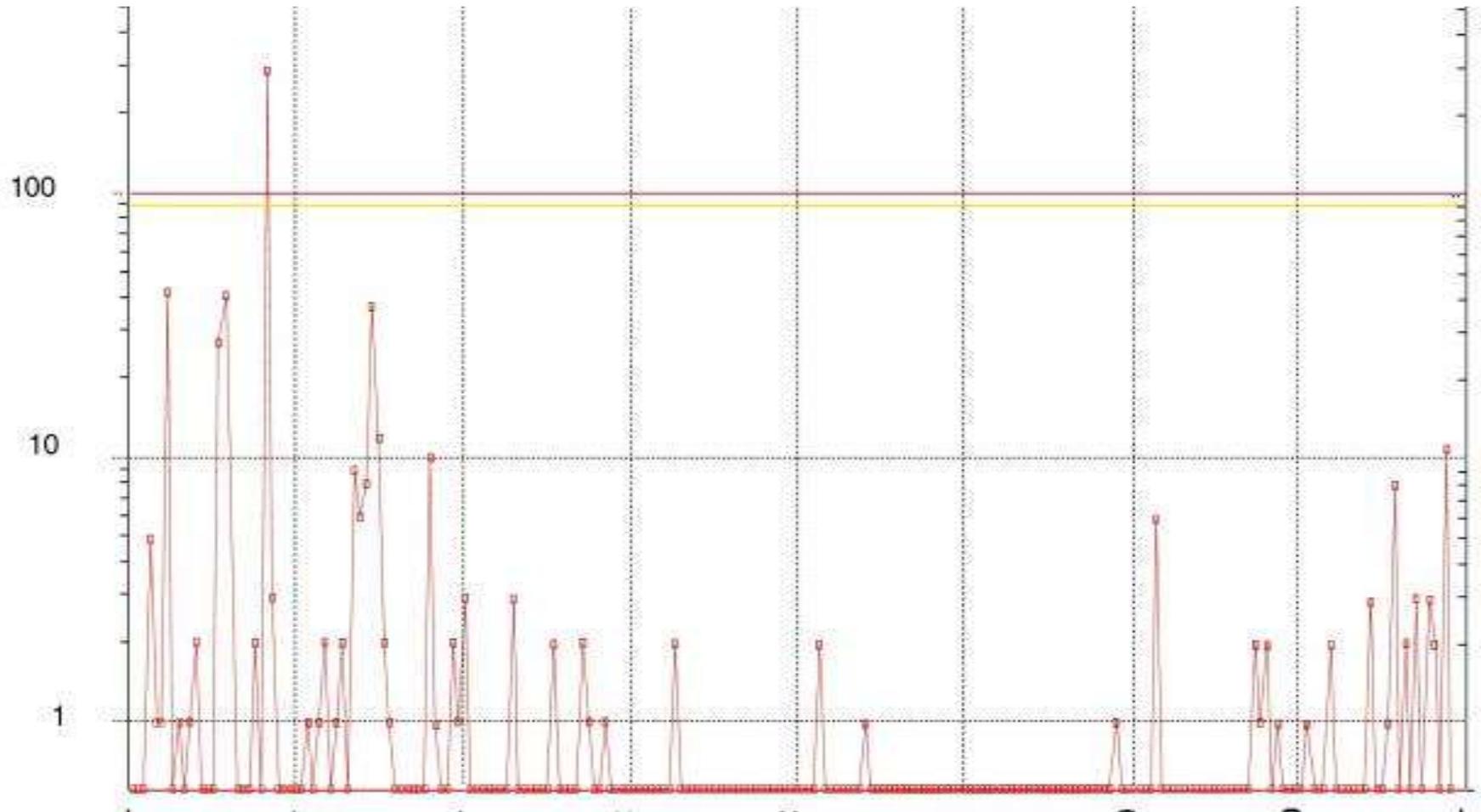
Particle counts in a 300MM etch tool





Particle Count Data

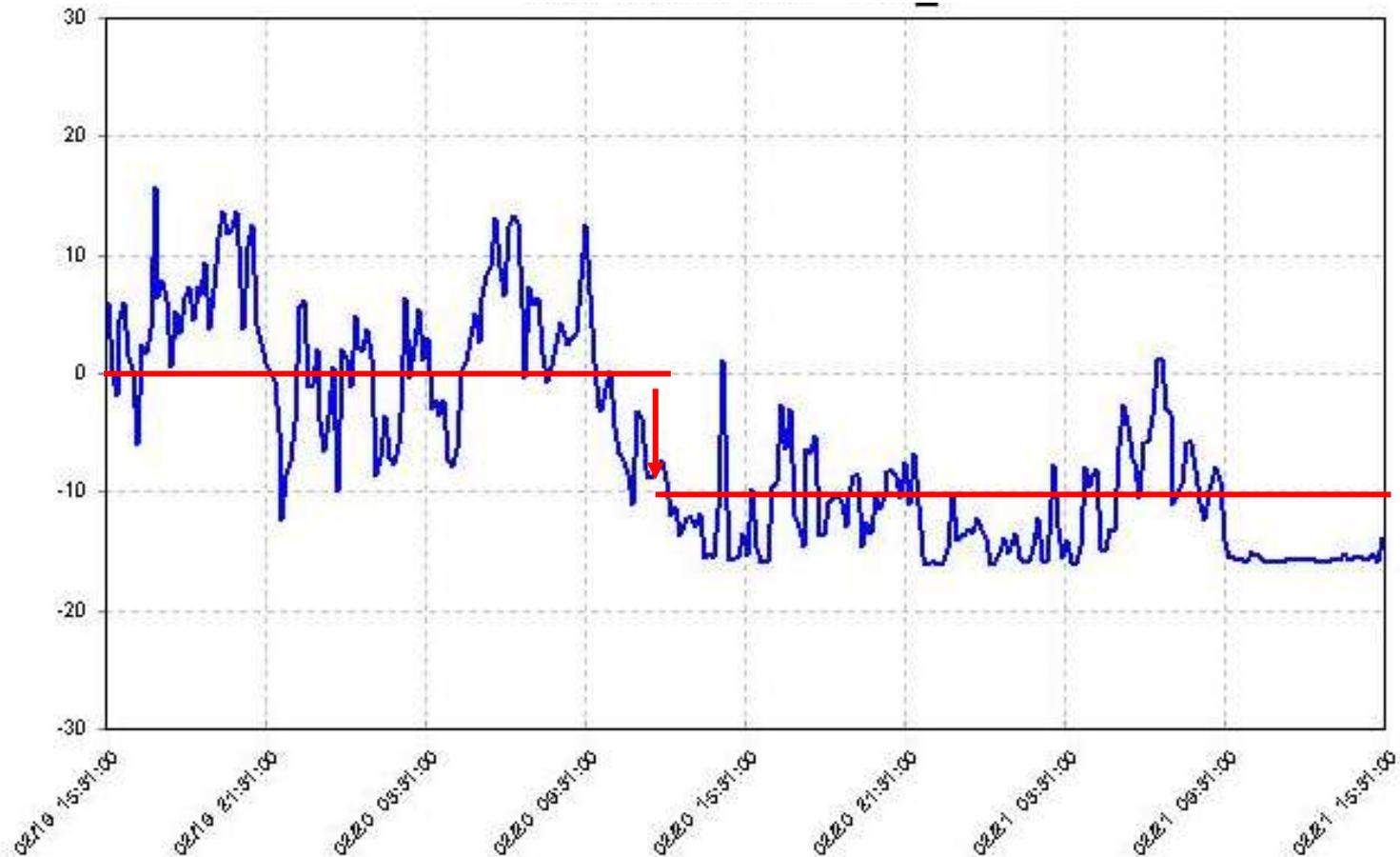
Particle counts in a 300MM sorter tool





Differential Pressure

Major shifts in differential pressure between two rooms





Thank You