# Title V Reporting at Wasatch Energy Systems

Bart Baker - System Manager at Wasatch Energy Systems

Mike Fishman – EXELE Information Systems, Inc.

Jump to first page

# Introduction

- The use of PI to meet our environmental reporting requirements
- Things to keep in mind when using PI for environmental reporting

Jump to first page

# About Wasatch

- Special Service District
- Burns municipal solid waste
- Generates steam and electricity
- Reduces landfill needs

Jump to first page

# Our “Fuel”

# Reporting Requirements

- CFR 40 part 60
- State Title V permit
- NOX, SO2, CO, opacity
  - O2
  - Steam
- At least two “good” 15 minute averages required to create an hourly average

Jump to first page

# Inops and Exceedances

- Inop Is a Loss of Valid Data Due to a Monitoring Equipment Problem
- Exceedance Is the Violation of Permitted Concentration, Opacity, or Emission Rate
- Each Inop or Exceedance Must Be Recorded and Assigned a Reason and Action

Jump to first page

# Reporting Requirements

- Monthly,Quarterly, Semi-annual and Annual Reports
- Quarterly EDR – Electronic Data Record
  - Comma Separated Values
  - Very Precise and Specific Format
  - Documents RATAs, CGAs, Exceedances and Inops

Jump to first page

# Our Hardware and Software …

Jump to first page


2003 3 11

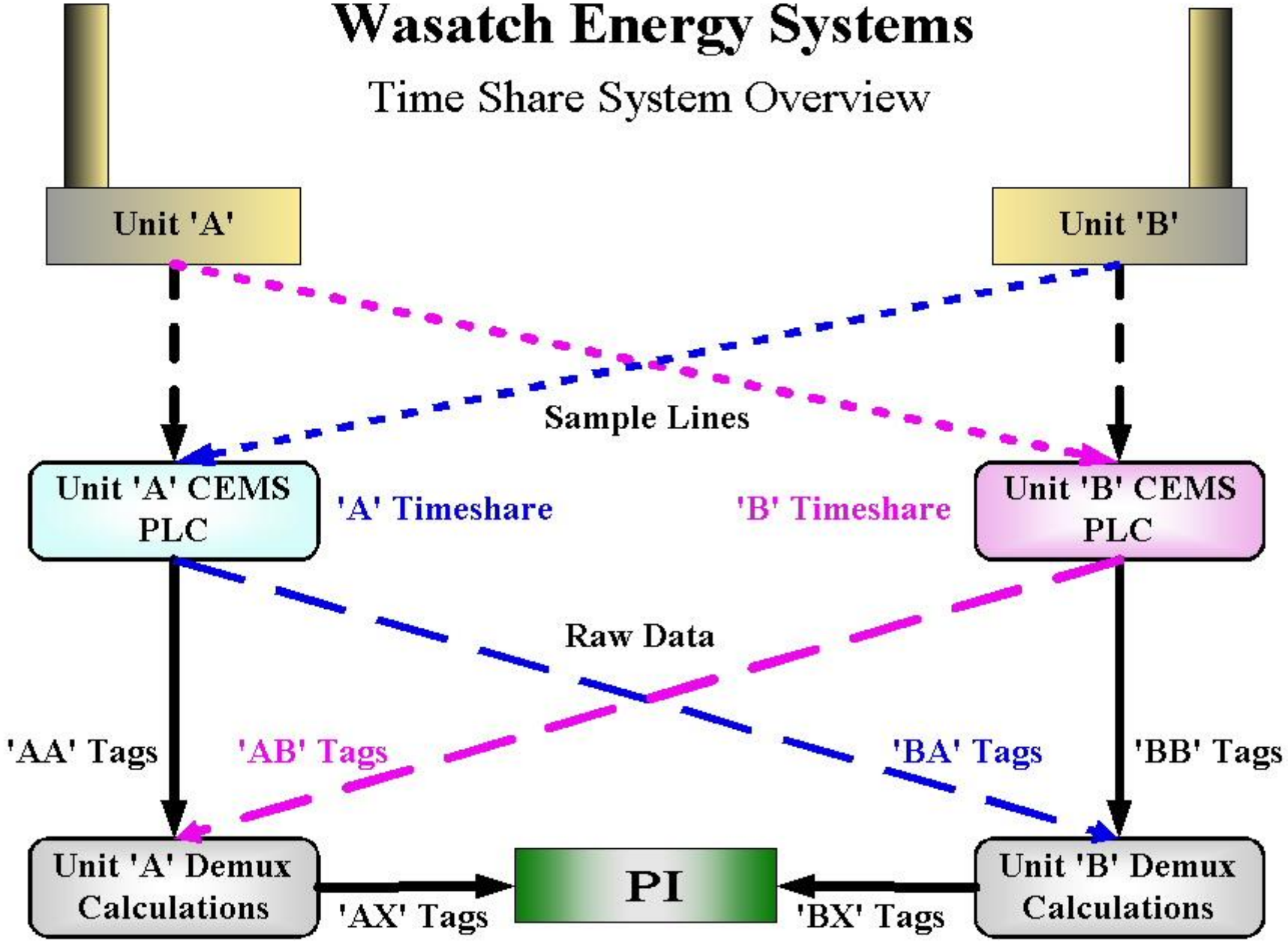
# CEMS Cabinets

- Mirror Imaged
- Contain AB PLCs
  - RSLinx
  - PI OPC Interface
- Provide Backup Via “Timeshare” Mode

Jump to first page

# Wasatch Energy Systems

## Time Share System Overview



# Software….

- PI – Application Platform
- PI ProcessBook
- MS Excel/DataLink
- VB Based Calculation Package
- Manual Entry Package
- TopView Alarm Annunciator

Jump to first page

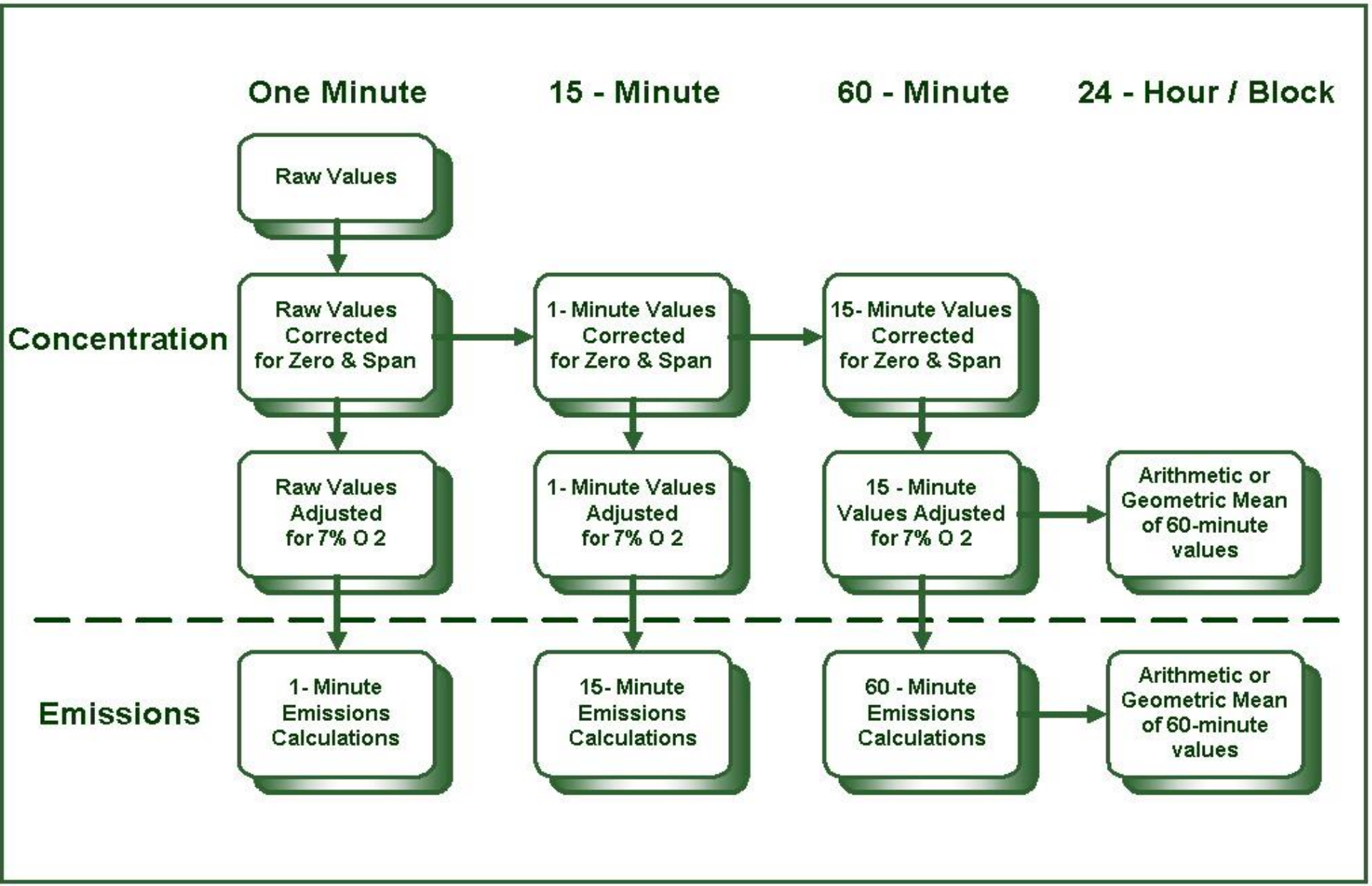
# Calculations

- Averages and Emissions
- Detection of Inops and Exceedances
- Approx. 30 VB Equation Modules
- Several Hundred PI Tags Receiving Calculation Results

Jump to first page

# Wasatch Energy Systems

## CEMS Calculations Overview



# Calculations…

- Can stop and restart without loss of context.
- Ability to “recalc” for past time periods.
- Produces “reminders” to enter reasons and actions.

Jump to first page

# TopView


WASATCH2 12:36:04 TopView
1 • BOFFLINE.EV • 24-Apr-03 12:39:00 • Unit B Running
248 • BCARBON15STAT.EV • 24-Apr-03 12:15:00 • 15 Min Carbon Status
248 • BCOADJ15STAT.EV • 24-Apr-03 12:15:00 • CO 15-Min O2 Adj Status
248 • BNOXADJ15STAT.EV • 24-Apr-03 12:15:00 • NOx 15-Min O2 Adj Status
248 • BO215STAT.EV • 24-Apr-03 12:15:00 • O2 15 Min Concentration St
248 • BPRECIP15STAT.EV • 24-Apr-03 12:15:00 • Precip 15 Min Status
248 • BSO2ADJ15STAT.EV • 24-Apr-03 12:15:00 • SO2 15-Min O2 Adj Status
213 • BSTM15STAT.EV • 24-Apr-03 12:15:00 • Steam 15 Min Status

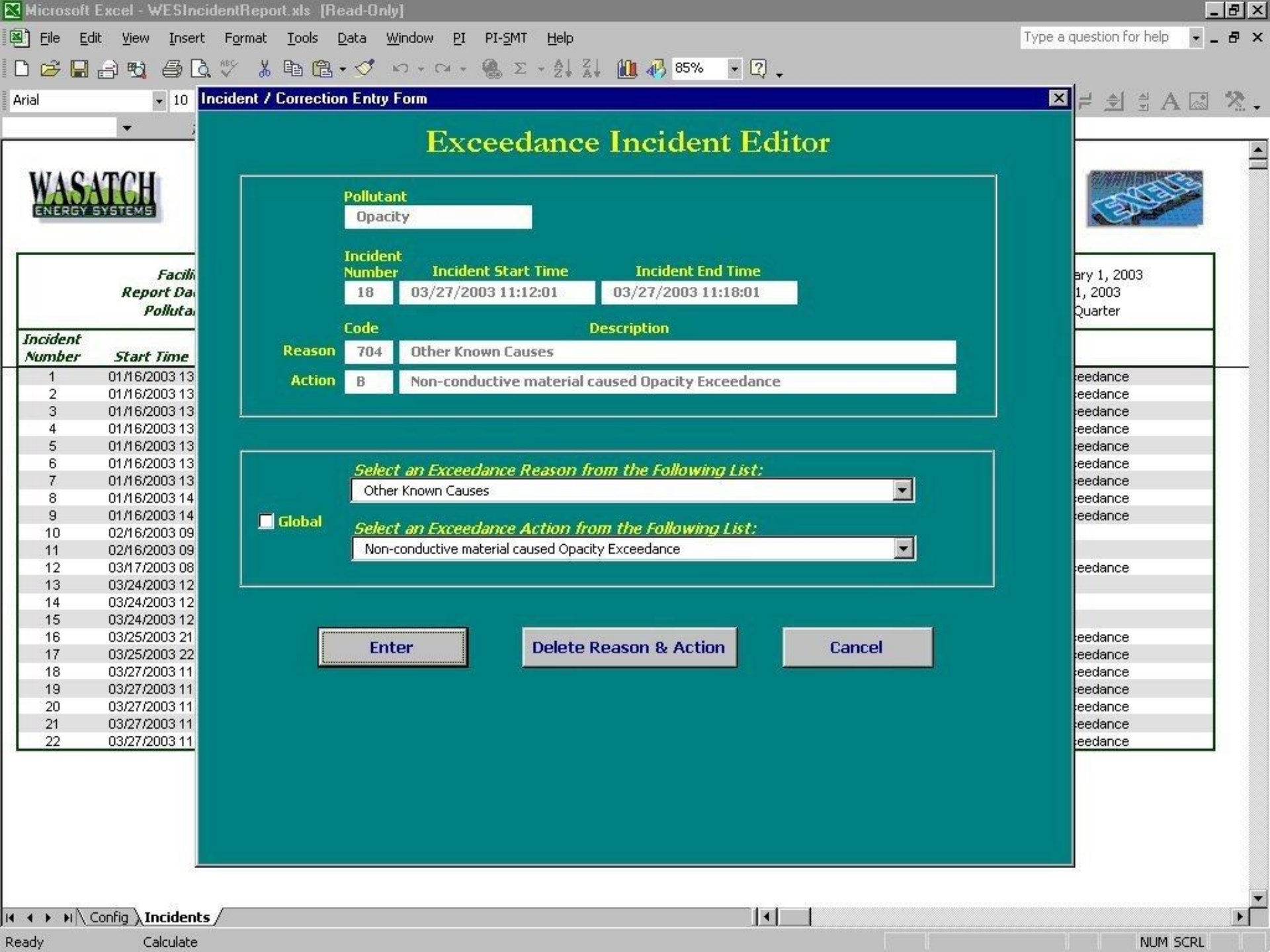
# Unit B CO Incident Editor

New Report | Edit Reason/Action

**Facility:** Wasatch Energy Systems - Layton, Utah
**Report Date:** April 21, 2003
**Pollutant:** CO

**Start Time:** January 1, 2003
**End Time:** April 1, 2003
**Time Frame:** Last Quarter

| Incident Number | Start Time | End Time | Incident Type | Reason Code | Reason Text | Action Code | Action Text |
|---|---|---|---|---|---|---|---|
| 1 | 01/09/2003 16:00 | 01/09/2003 18:00 | Inop | 721 | Monitor Equipment Malfunction | C | CO Analyzer Failed Causing Inop |
| 2 | 02/02/2003 11:00 | 02/02/2003 12:00 | Inop | 724 | Other Known Causes | C | Power Outage Caused Inop |
| 3 | 03/16/2003 | | Exceedance | 703 | Process Problems | G | Feedgrate Failure (Emergency) |


Microsoft Excel - WESIncidentReport.xls [Read-Only]
File Edit View Insert Format Tools Data Window PI PI-SMT Help
Type a question for help
Arial 10
Incident / Correction Entry Form
Exceedance Incident Editor
Pollutant
Opacity
Incident Number
Incident Start Time
Incident End Time
18
03/27/2003 11:12:01
03/27/2003 11:18:01
Code
Description
Reason
704
Other Known Causes
Action
B
Non-conductive material caused Opacity Exceedance
Select an Exceedance Reason from the Following List:
Other Known Causes
Global
Select an Exceedance Action from the Following List:
Non-conductive material caused Opacity Exceedance
Enter
Delete Reason & Action
Cancel
WASATCH ENERGY SYSTEMS
Incident Number
Start Time
1 01/16/2003 13
2 01/16/2003 13
3 01/16/2003 13
4 01/16/2003 13
5 01/16/2003 13
6 01/16/2003 13
7 01/16/2003 13
8 01/16/2003 14
9 01/16/2003 14
10 02/16/2003 09
11 02/16/2003 09
12 03/17/2003 08
13 03/24/2003 12
14 03/24/2003 12
15 03/24/2003 12
16 03/25/2003 21
17 03/25/2003 22
18 03/27/2003 11
19 03/27/2003 11
20 03/27/2003 11
21 03/27/2003 11
22 03/27/2003 11
Config Incidents
Ready Calculate
NUM SCRL

```
110,UNIT A,1,2003,1909.933333,,,,,,,,,
200,UNIT A,NOX,Rosemount,951 C,1000215,500 ppm,500 ppm,8/01/96,Stack A,,,,,
220,UNIT A,CO,02/02/03,11:00,02/02/03,12:00,724,C,No,,,,,
260,UNIT A,O2,03/31/03,1,ALM044780,7/9/05,Protocol 1,%,4.91,4.99,-1.6%,P,Low,
300,UNIT A,Opacity,RS96006884,0 %,0,0,0,0,0,0,0,,,,
310,UNIT A,SO2,24,1.257 %,24,0,0,0,0,31,ppm,24-Hr GMA,,
400,UNIT A,01/16/03,13:18,1.13,704,B,,,,,,,,
410,UNIT A,03/02/03,23:00,40.66,701,A,,,,,,,,
600,UNIT A,Y,Y,Y,Y,,,,,,,,,
700,701,Startup/Shutdown,,,,,,,,,,,,
700,702,Control Equipment Problems,,,,,,,,,,,,
700,703,Process Problems,,,,,,,,,,,,
700,704,Other Known Causes,,,,,,,,,,,,
700,705,Unknown Causes,,,,,,,,,,,,
720,721,Monitor Equipment Malfunction,,,,,,,,,,,,
720,722,Nonmonitor Equipment Malfunction,,,,,,,,,,,,
720,723,QA Calibrations,,,,,,,,,,,,
720,724,Other Known Causes,,,,,,,,,,,,
720,725,Unknown Causes,,,,,,,,,,,,
730,701,A,Emissions High During Startup Procedure,,,,,,,,,,
730,701,B,Emissions High During Shutdown Procedure,,,,,,,,,,
730,702,A,Control Equipment Problems,,,,,,,,,,
730,702,B,Unavoidable BreaCarbon Equipment Failure,,,,,,,,,,
730,703,A,Grate Failure (Unavoidable Breakdown),,,,,,,,,,
730,703,B,Power Outage (Emergency),,,,,,,,,,
730,703,C,Precip Hopper Plug (Unavoidable Breakdown),,,,,,,,,,
730,703,D,Lance Maintenance Caused High Precip Inlet Temp,,,,,,,,,,
730,703,E,Precipitator Maintenance Caused Opacity Exceedance,,,,,,,,,,
730,703,F,Precipitator Hopper Plug Caused Opacity Exceedance,,,,,,,,,,
730,704,A,Exempt Carbon Feed Low per 11/02 Letter,,,,,,,,,,
730,704,B,Non-conductive material caused Opacity Exceedance,,,,,,,,,,
730,704,C,Incorrect Setpoint For Steam Alarm,,,,,,,,,,
730,705,A,Unknown Cause (Don't Use),,,,,,,,,,
```

PI - ProcessBook - [Unit A [Read Only]*]

File Edit View Insert Tools Draw Arrange Window Help

# System Status - Unit A

Workstation: 04/23/2003 09:54:06
**PI Server: 04/23/2003 09:57:09**

| Unit B | Current 1 - Min Avgs | 45 - 59 Mins Averages | 0 - 14 Mins Averages | 15 - 29 Mins Averages | Current 15 - Min Avgs | Hourly Averages |
|---|---|---|---|---|---|---|
| O2 % | Invalid Data | 10.5 | 10.6 | 10.3 | 10.5 | 10.7 |
| NOx ppm | Invalid Data | 132.0 | 127.0 | 123.9 | 122.6 | 141.1 |
| NOx ppm 7% O2 | Invalid Data | 176.5 | 170.9 | 163.1 | 163.1 | 193.1 |
| NOx lb/hr | Invalid Data | 26.4 | 25.5 | 24.4 | 24.3 | 28.8 |
| CO ppm | Invalid Data | 7.3 | 7.4 | 5.9 | 4.6 | 9.4 |
| CO ppm 7% O2 | Invalid Data | 9.7 | 10.0 | 7.8 | 6.1 | 12.9 |
| CO lb/hr | Invalid Data | 0.9 | 0.9 | 0.7 | 0.6 | 1.2 |
| SO2 ppm | Invalid Data | 17.8 | 10.3 | 16.9 | 13.5 | 12.8 |
| SO2 ppm 7% O2 | Invalid Data | 23.8 | 13.9 | 22.3 | 18.0 | 17.6 |
| SO2 lb/hr | Invalid Data | 4.9 | 2.9 | 4.6 | 3.7 | 3.6 |
| Precipator Temp | 303.0 | 296.5 | 303.7 | 296.2 | 305.0 | 298.2 |
| Steam Flow klb/hr | 52.8 | 52.8 | 52.7 | 52.9 | 52.6 | 52.7 |
| Carbon Flow lb/hr | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 |

| Opacity 6-Min Averages | |
|---|---|
| 48 - 53 Min | 3.4 |
| 42 - 47 Min | 3.4 |
| 36 - 41 Min | 3.5 |
| 30 - 35 Min | 3.4 |
| 24 - 29 Min | 3.4 |
| 18 - 23 Min | 3.4 |
| 12 - 17 Min | 3.5 |
| 06 - 11 Min | 3.4 |
| 00 - 05 Min | 3.4 |
| 54 - 59 Min | 5.7 |

A CEMS
BACKFLUSH

B CEMS


CO Emission
2.72


SO2 Emission
13.72


NOx Emission
114.06


Opacity
3.36

| Unit A | Value | Limit |
|---|---|---|
| CO | 20.4 | 100.0 |
| SO2 | 16.8 | 31.0 |
| NOx | 253.3 | 350.0 |
| Precip | 303.0 | 332.6 |
| Steam | 52.7 | 56.1 |
| Opacity | 3.6 | |

| Unit Status |
|---|
| Sampling |
| O2 Valid |
| CO Valid |
| NOx Valid |
| SO2 Valid |
| Opac. Valid |

| Unit B | Value | Limit |
|---|---|---|
| CO | 27.2 | 100.0 |
| SO2 | 20.4 | 31.0 |
| NOx | 237.3 | 350.0 |
| Precip | 303.0 | 332.6 |
| Steam | 52.3 | 56.1 |
| Opacity | 1.2 | |

| Unit Status |
|---|
| Sampling |
| O2 Valid |
| CO Valid |
| NOx Valid |
| SO2 Valid |
| Opac. Valid |

* = EXCEEDANCE ALARM
\# = EXCEEDANCE WARNING
C = CALIBRATION OCCURED
D = STACK OFFLINE
F = MALFUNCTION
M = MAINTENANCE
N = LESS THAN MINIMUM
X = INSTRUMENT OUT OF CONTROL
U = START UP
S = SHUTDOWN

Ready

# Project Execution

- Searched, Interviewed and Selected PI System Integrator.
- Installed VPN Capability.
- Used Simulators at Start.
- Ten Days of Meetings With Integrator.
- Were Able to Run New System in Parallel With Old.

Jump to first page

# Summary

- A Complex System That Came Together Smoothly
  - Open Architecture.
  - Standard, Configurable Tools.
- We Have All the Application Code Available to Us.
- PI Has Proven to Be an Ideal Platform

Jump to first page

# Things to Keep in Mind…..

- PI Server
- Averaging
- Time Stamping
- Data Types
- Tag Naming
- Tracing
- Recalc
- Overrides

Jump to first page

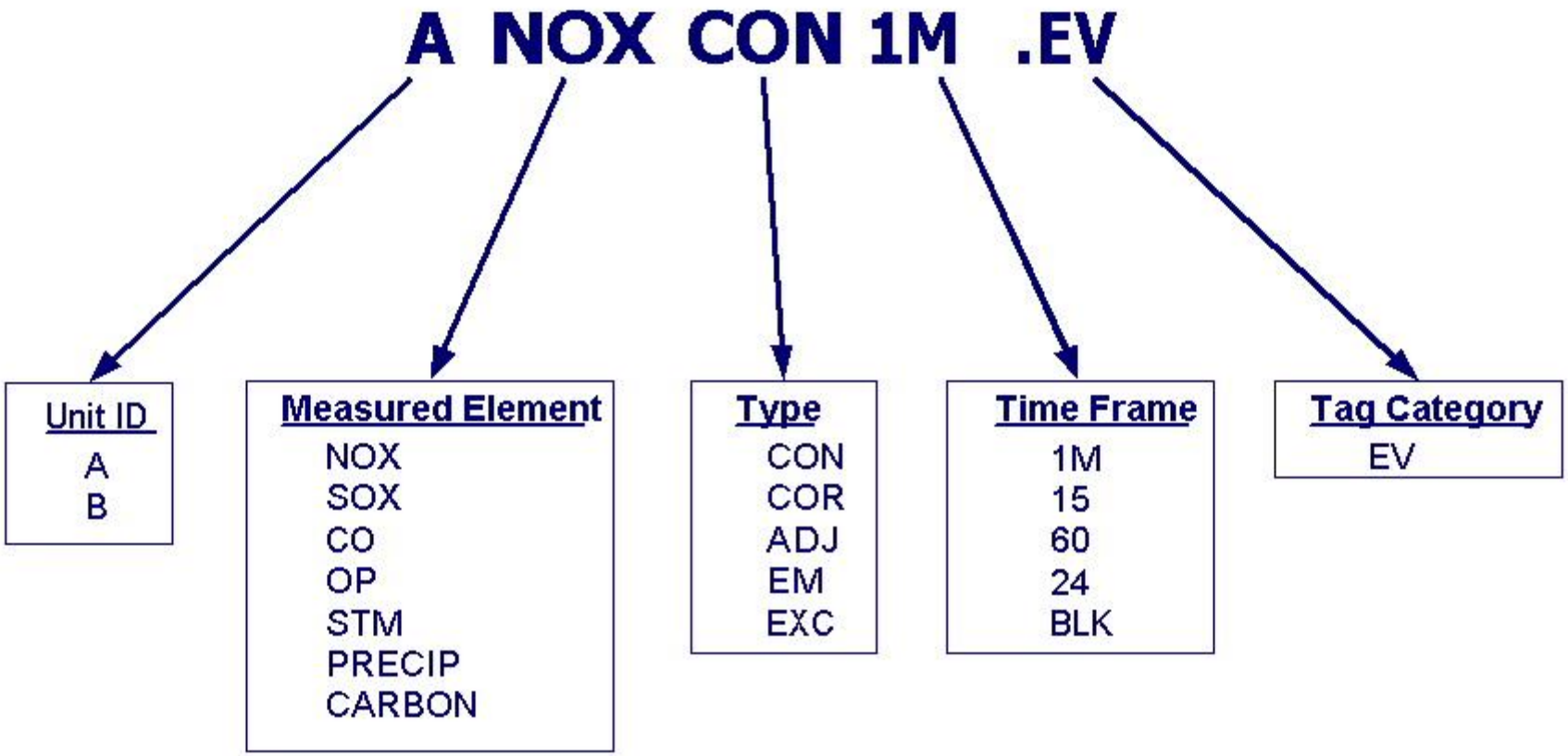
- Use a dedicated PI server if possible.
  - Avoids interference from other plant activities.
  - Data custody.
  - Data retention.
- Averaging –
  - Can’t just average raw values.
  - Each value needs to be validated.
  - Store results without compression.

Jump to first page

- Time stamping – typically at beginning of time period.
- Data types –
  - use full precision for manual input values and calculations.
  - Use integers to hold “state” data
- Tag naming – use structured tag names.

Jump to first page

# PI Tag Naming Convention



- Tracing – aids in development, testing and auditing.
- Recalculation – allows Manual Inputs to be re-processed, BAF's to be reapplied, logic errors to be corrected.
- Overrides – provide ability to correct for operations or maintenance errors.

Jump to first page

# Thank You!

## Q&A

Jump to first page