Enterprise Environmental Compliance Monitoring and Reporting

Ray Fain
Vice President, Data Systems – QA Support, LP
November 2012
Agenda

QA Support, LP and NRG Energy, Inc.

Enterprise Environmental Challenges

QA Advantage Systems

QA Enterprise Advantage at NRG Energy, Inc.

QA Site Advantage and QA Emission Point Advantage
Presenters

- Ray E. Fain, Jr.
  - Vice President, Data Systems
  - QA Support, LP

- Patrick Yough
  - Environmental Supervisor
  - NRG Energy, Inc.

- Perry Galloway
  - Sr. Environmental Specialist
  - NRG Energy, Inc.
QA Support, LP

- QA Support, LP has provided environmental air solutions and project resources since 2000 - headquartered in La Porte, Texas with a coast-to-coast customer base

- Our Staff
  - Consultants
  - Engineers
  - Scientists
  - Technical Specialists

- “Subject Matter Experts” in emissions monitoring, reporting, controls and industrial services

- QA Advantage – enterprise and site emissions software solutions
NRG Energy, Inc. One of the Nation’s Largest Diversified Generation Portfolios

Diversity of fuel-type, dispatch level, and geographic region help mitigate risk and moderate market demand cycles

Updated based on 2011 10K report

Northeast
- Gas 1,300 MW (58%)
- Oil 4,015 MW (19%)
- Coal 1,600 MW (23%)

South Central
- Coal 4,190 MW (64%)
- Gas 1,495 MW (36%)

Western
- Gas 2,680 MW (74%)
- Coal 1,175 MW (11%)

Renewables
- Solar 955 MW (26%)

Texas
- Nuclear 1,175 MW (11%)

Northeast:
- Gas 1,300 MW (58%)
- Oil 4,015 MW (19%)
- Coal 1,600 MW (23%)

South Central:
- Coal 4,190 MW (64%)
- Gas 1,495 MW (36%)

Western:
- Gas 2,680 MW (74%)
- Coal 1,175 MW (11%)
- Renewables: Solar 955 MW (26%)

Updated based on 2011 10K report

1 Includes 550 MW under construction
2 Includes 860 MW solar under construction

Plus approximately 1,000 MW international generation and 120 MW other N. America (Dover, DE & Harrisburg, PA)
Environmental Monitoring and Reporting Industry Challenges

- Environmental monitoring and reporting has evolved for over 20 years

- Constantly changing technology
  - Some keep up with technology
  - Many struggle with technology updates
  - Most are a mixture of legacy proprietary hardware and data architectures

- Challenges in today's corporate environments
  - Cyber security and networking requirements
  - Antiquated reporting and database applications
  - Manual processing and constant duplication of data – *spreadsheets become the database!*
Corporate Demands for Timely and Accurate Information

Regional emissions tracking
System limit and consent decree compliance
Real time ozone season monitoring
System dispatch
Emission forecasting

Emissions Trading and Accounting

Environmental Managers

Commercial Operations

Engineering

Operations Managers
Where is this Information?

- Corporate Custom Databases
- Corporate Environmental Data Systems
- Accounting Systems
- Manual Spreadsheets
- Distributed Control Systems
- Site Environmental Data Systems
- Site Historians

Reporting is required across many disparate systems

Data is often replicated to facilitate reporting

Historical emissions data can change, triggering multiple data level updates

Data accuracy is difficult to maintain
QA Support, LP – Opportunities for Solutions

- Provide an open and user-friendly reporting environment
- Leverage existing spreadsheets as reports
- Eliminate duplication of data
- Automate data distribution
- Replace obsolete and proprietary systems
- Create a product family of solutions
- Utilize the best applications and products from Rockwell Automation
Environmental Definitions - CEMS

- Continuous Emissions Monitoring System (CEMS)
- Direct flue gas stream sampling
- Sample conditioned for multiple pollutants ($\text{SO}_2$, $\text{NO}_x$, $\text{CO}_2$, Hg, PM) and sent to analyzers
- Daily and quarterly compliance audits performed
- 100% system availability desired
Environmental Definitions - DAHS

- Data Acquisition and Handling System (DAHS)
- CEMS data collection and storage
- Regulatory required emissions calculations and historical data editors
- Federal and state reporting formats
  - Part 75 – SO$_2$ and NO$_x$ – Acid Rain cap and trade – XML reporting
  - Greenhouse Gas (GHG) for CO$_2$ reporting and trading
  - Part 60 – State and local command and control reporting
  - NO$_x$ RACT – Reasonably Achievable Control Technologies
QA Enterprise Advantage Solutions

- Calibration Gas
- Sample Conditioning
- SoftCEMS
- Analyzer
- Analyzer

Local User Interface

Environmental
Operations
Engineering

- CEMS Database
- Alarms
- Emissions Calculations
- Data Validation
- Data Analysis
- Compliance Reporting
QA Advantage and Rockwell Automation

- **QA Advantage** leverages the suite of Rockwell Automation applications and components:
  - *FactoryTalk* VantagePoint EMI
  - *FactoryTalk* View Site Edition (SE)
  - *FactoryTalk* Transaction Manager
  - Allen-Bradley PAC Solutions:
    - CompactLogix
    - ControlLogix
    - SoftLogix
    - Point IO
QA Advantage – Key Features

- Web-based reporting and trending
  - One location for all system access
  - Powerful user access management with role based security

- Trending
  - Powerful and efficient means to interact with the data
  - Used for both repetitive and ad-hoc data analysis
  - Simple drag and drop interface

- Microsoft Excel™ reports
  - Familiar tools to design, deploy and manage reports
  - Provides open user interface for all custom reporting and calculation requirements
**QA Enterprise Advantage** Unique Data Aggregation Features

- **QA Enterprise Advantage** aggregates data across diverse corporate data sources into ONE central location for MANY consumers.

- Data is retrieved from sources “on-demand” with no data replication necessary.

- Native connectors to sources provides simultaneous access to all data in the legacy systems:
  - Microsoft SQL Server™
  - Oracle
  - DB2
  - OSI-PI™
  - DCS Historians
  - OPC
  - ODBC
QA Advantage Visualization with Trends
# QA Enterprise Advantage Reporting - Monthly Emission Tons

## NOx Tons

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## CO2 Tons

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**Note:** The tables above represent the monthly emission tons for NOx, SO2, and CO2. The data is organized by unit number and month, with columns indicating the emissions for each month from January to December.
QA Enterprise Advantage – SO$_2$ Exceedance/Performance Forecasting

SO2 lbs/mmBTU 24 hour and 30 day Rolling Average Projections

Current DAHS Time: 9/17/2012 6:17
Hours to 30 day exceedance limit: Rate @ 0.22: 4.46 Rate @ 0.45: 9.12
Hours to 24 hour exceedance limit: 2694

Last Hour SO2 lbs/mmBTU: 0.097

24 Hour Rolling Average

30 Day Rolling Average
QA Enterprise Advantage – Opacity Exceedance Monitoring
QA Enterprise Advantage – Opacity Exceedance Part 60 Reporting

QAS
Johnson County Facility
Opacity 40CFR60.7 Performance Summary
Unit 1

Pollutant: Opacity pct
Averaging Interval: 6 minute
Reporting Period Dates: From: 10/1/11 0:00 To: 12/31/11 23:59

Company: QAS
Address: La Porte TX

Emission Limitation: 15 pct
Exceptional Limitation: 20 pct
Monitor Manufacturer and Model No.
Date of Last COMS Certification or Audit:
Process Unit Description:

Total source operating time in reporting period: 132384 minutes

COMS Emission Data Summary
1. Duration of COMS excess emissions in reporting period due to:
   a. Control Equipment Problems 0.00
   b. Other Known Causes 36.00
   c. Process Equipment Problems 0.00
   d. Startup/Shutdown 2820.00
   e. Unknown Causes 0.00
2. Total Duration of Excess Emissions: 2856.00
   Total Duration of Excess Emissions in % of Operating: 2.16

COMS Performance Summary
1. COMS downtime in reporting period due to:
   a. Monitor Equipment Malfunctions 0.00
   b. Non-Monitor Equipment Malfunctions 0.00
   c. Other Known Causes 120.00
   d. Quality Assurance Calibration 0.00
   e. Unknown Causes 0.00
2. Total COMS Downtime: 120.00
   Total Duration of COMS Downtime in % of Operating: 0.09
3. Operating Time: 2.16
QA Emissions Structure

- The VantagePoint Model is automated for both configuration and data navigation
- Logical ordering of emissions data
- Broken down into different sites, units, programs, etc.
- Easy to differentiate between data types
NRG and QA Enterprise Advantage?

- NRG has CEMS emissions data residing in 5 different vendors’ DAHS across multiple states
  - Regulatory analysis for new EPA and state rules
  - Multiple analysis of emissions by state and regions, fuel type, seasonal totals
  - Real-time (hour and minute) values needed for various facilities
  - Compliance averaging i.e. NO_x RACT
  - Multi-plant fuel sulfur reports aggregated into one report
  - CEMS CO_2 tons for GHG inventories
  - Overall time savings and data accuracy

- QA Enterprise Advantage is currently aggregating at NRG:
  - >165 emission sources
  - >35 data sources
  - >40,000 data tags
Who needs consolidated emissions data at NRG?

- Corporate environmental
- Emissions traders
- Commercial operations (New York and Texas)
- New York and Texas NO$_x$ RACT
- Accounting
- Development-repowering initiatives
## Current Year Emissions Compared to Consent Decree Limits

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<th>Emissions</th>
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<td></td>
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<td>Station B</td>
<td>CS0003</td>
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</table>

| Combined Total | 427.2 | 1,822.1 | 5,391,591 |
|                | **Sum** |         |           |
|                | 427.2 | 1,822.1 | 5,391,582 |

2012 Limits
- NOx Mass (tons) 3,241
- SO2 Tons (tons) 16,807
- Margin (tons) 2,814
- or Limit - Emissions (%) 13.2% 10.8%

Pro-rated Limits
- NOx Mass (tons) 1,399
- SO2 Tons (tons) 7,630
- Prorated Margin (tons) 971
- or Limit - Emissions (%) 30.5% 23.9%
QA Enterprise Advantage Reporting - NOx RACT Compliance

Texas

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<th>Clock Hour</th>
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<th>Heat Input</th>
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New York

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CEMS NOx Data - Daily and 30-Day Average

- NOx Daily Limit: 55.8 Tons
- NOx 30 Day Limit: 33.7 Tons
### QA Enterprise Advantage Reporting – NOₓ RACT Forecasting

**Forecasted Emissions**

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<th>Day</th>
<th>Date</th>
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<th>YTD Forecast</th>
<th>YTD Report</th>
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**HGB NOₓ Tons 30 Day Average and Forecast**

**HGB NOₓ Tons YTD Total and Forecast With Limit**
## QA Enterprise Advantage Reporting – Daily SO₂ Emissions – Coal Plants

### Coal Plants SO₂ lb/mmBtu Report

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Future Expansion of NRG’s QA Enterprise Advantage System

- GHG reporting for Part 98 sources aggregating CO₂ tons/hr
- Water usage and thermal discharge reports
- MARS – mercury analysis and reporting
- Additional state emissions and compliance reports
- **QA Site Advantage** Part 75 and Part 60 systems
QA Site Advantage DAHS

- Part 60 (Permit) and Part 75 (Acid Rain EDRs) reporting

- Microsoft SQL Server for storing all data values, calibrations, alarms, etc.

- Automatic calculations of measured, derived, missing data, quarterly and yearly regulatory totals

- Standard Reporting:
  - Daily Average
  - Emissions Totals
  - Operating Time
  - Alarms
  - Air Permit
  - QA/QC
QA Site Advantage DAHS Leverages Rockwell Automation

- Rockwell Automation FactoryTalk:
  - VantagePoint EMI
  - View SE Server
  - View SE Client
  - Transaction Manager
  - Alarms and Events
  - RS Logix 5000
  - RS Linx Enterprise
  - RS SoftLogix
  - RS CompactLogix
  - PointIO

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Hourly Operating Values

NOx Rate Averages
Point-and-click user interface for management, monitoring and instant configuration changes

Data and configuration push to QA Site Advantage
  - Two-stage store and forward
    - Level 1 – 3 days of minute data for ~70 parameters to QA Data Exchange with full buffer alarms
    - Level 2 – over 365 days from QA Data Exchange to QA Site Advantage
  - Automated data re-synchronization
  - Live configuration management

Flexible I/O Options
QA Advantage – Performance Returns

PMA 88% before QA Site Advantage

PMA >97% After QA Site Advantage

Measurable Performance Improvement with QA Site Advantage
Percent Monitor Availability (PMA) Increased from 88% to 97%
Summary

- QA Support, LP developed a portfolio of solutions (QA Advantage) that incorporates the reliability and versatility you expect from the family of FactoryTalk products.

- Because the system configuration is automated in the VantagePoint Model Builder from both the QA Emission Point Advantage and QA Advantage Data Tools, it allows for rapid deployment of solutions.

- The rich feature set in VantagePoint EMI allows us to deliver emissions and performance data seamlessly to corporate decision-makers.

- Microsoft Excel™ with VantagePoint EMI places the power and flexibility quickly into the customer’s hands for any reporting requirement.
Questions

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rfain@qasupport.com – 281-307-1000

November 2012