

# **REINHOLD ENVIRONMENTAL Ltd.**

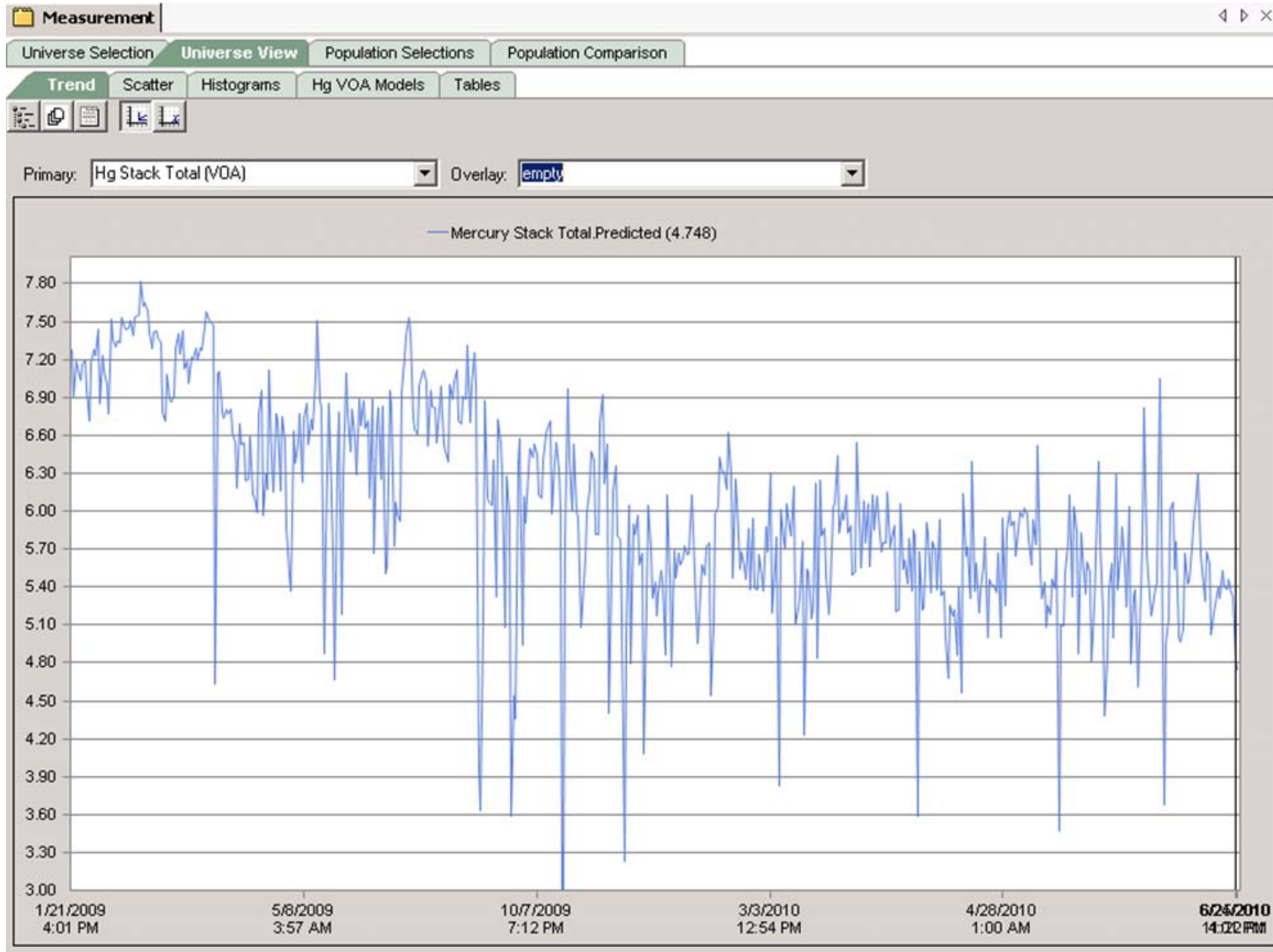


## **2011 NO<sub>x</sub>-Combustion Round Table & Expo Presentation**

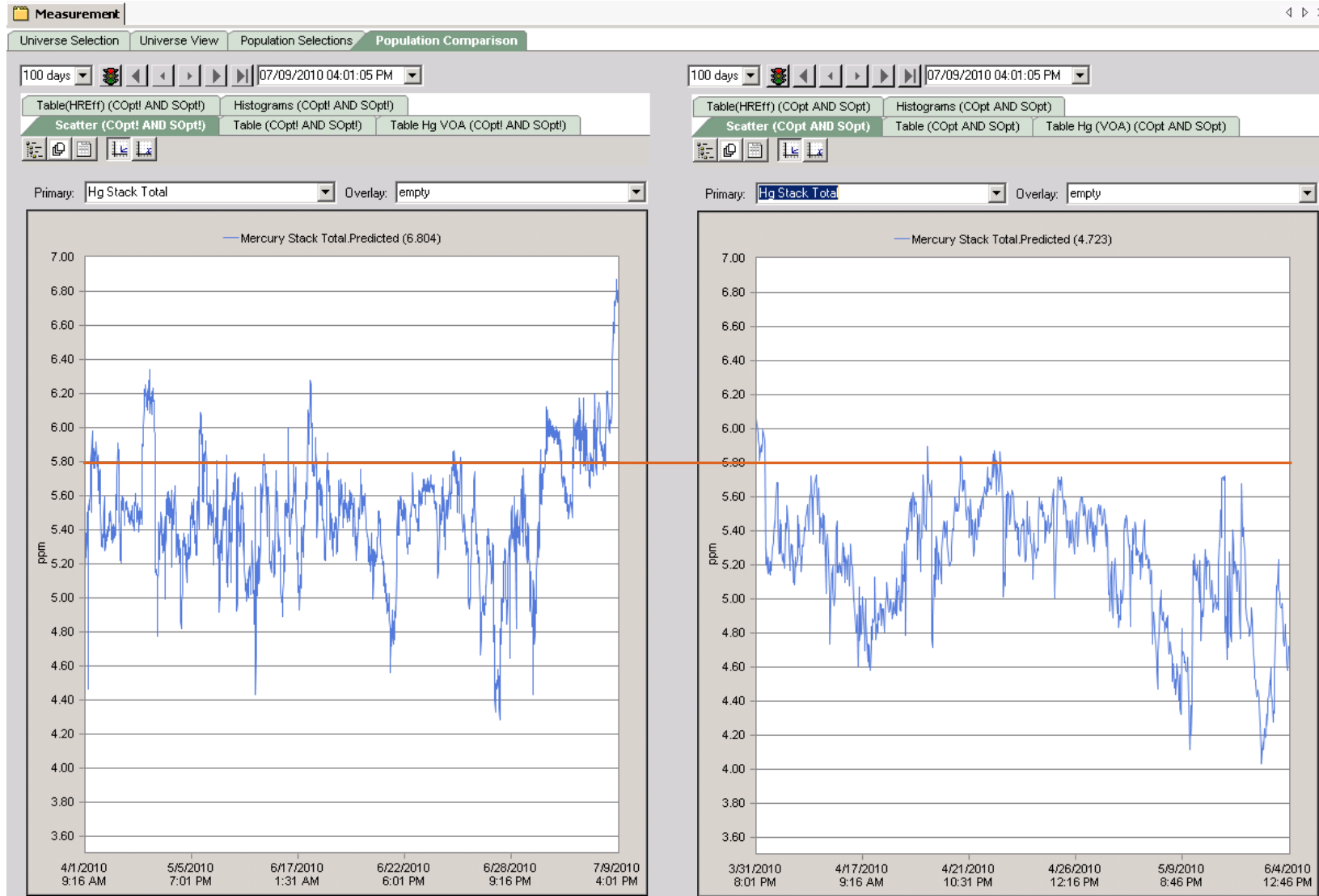
February 7-8, 2011, in Birmingham, AL / Hosted by Southern Company

All presentations posted on this website are copyrighted by Reinhold Environmental, Ltd (RE). Any unauthorized downloading, attempts to modify or to incorporate into other presentations, link to other websites, or obtain copies for any other uses than the training of attendees to RE's Conferences is expressly prohibited, unless approved in writing by RE or the original presenter. RE does not assume any liability for the accuracy or contents of any materials contained in this library which were presented and/or created by persons who were not employees of RE.

# Long-Term Mercury Trend: Fuel Blend Considered

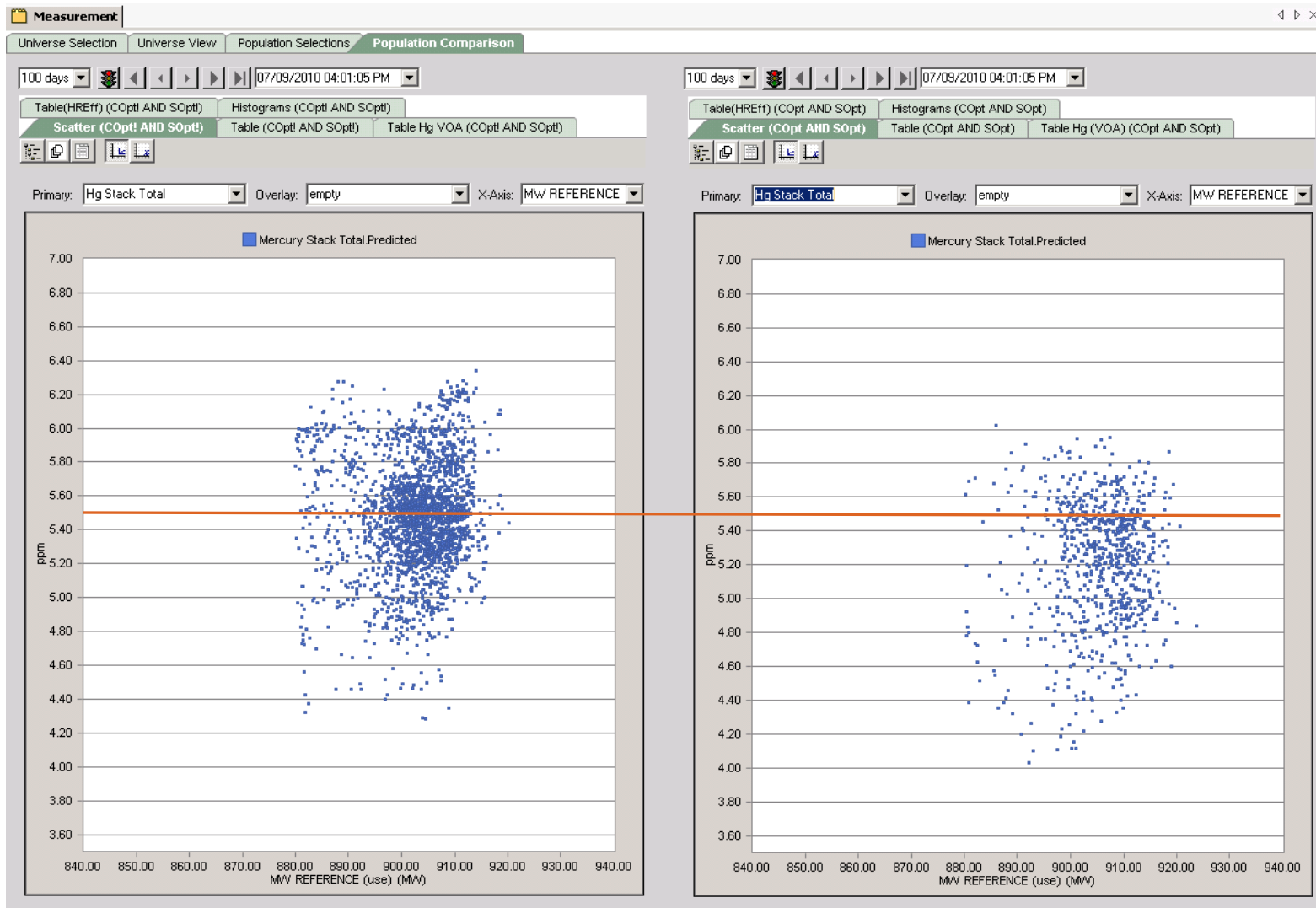


# Stack Mercury On vs. Off



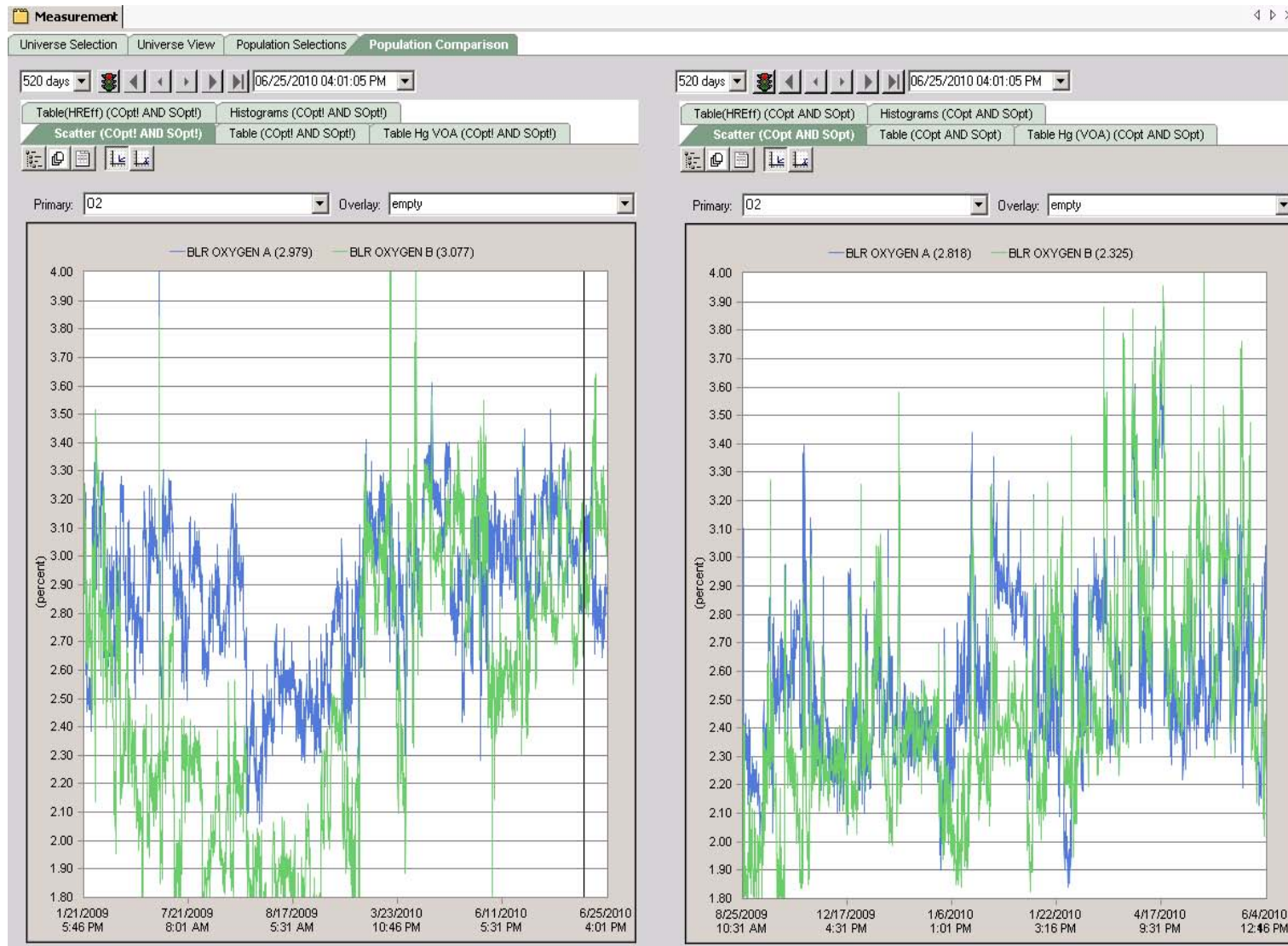
*Hg Stack Total, VOA predicted  $f(O_2, Tilts, MW, Blend)$   
OFF(Left) vs. ON(Right) populations*

# Stack Mercury On vs. Off Alt View



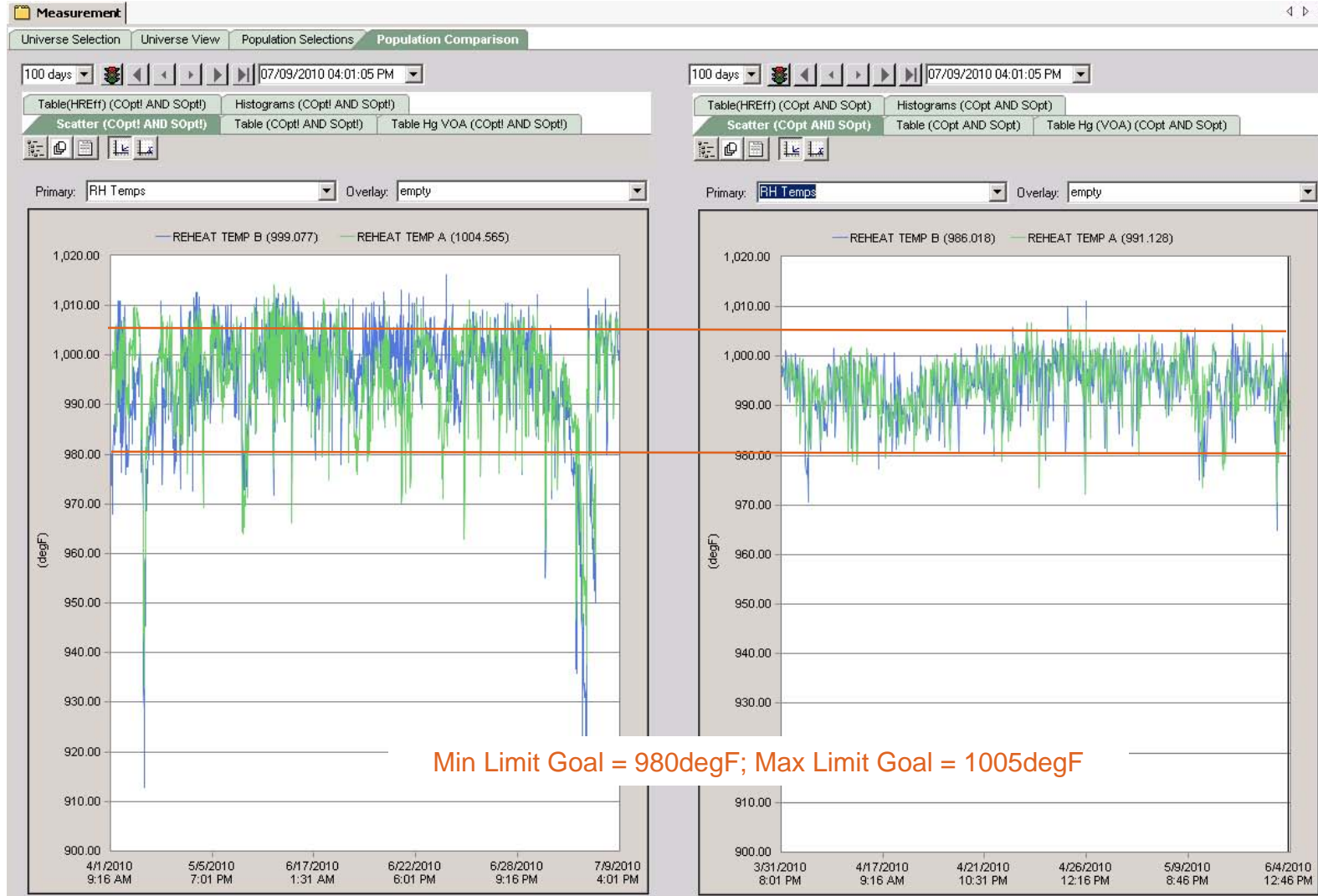
VOA Predicted Mercury Stack Total OFF(Left) vs. ON(Right) populations

# A & B Side O2 Comparison

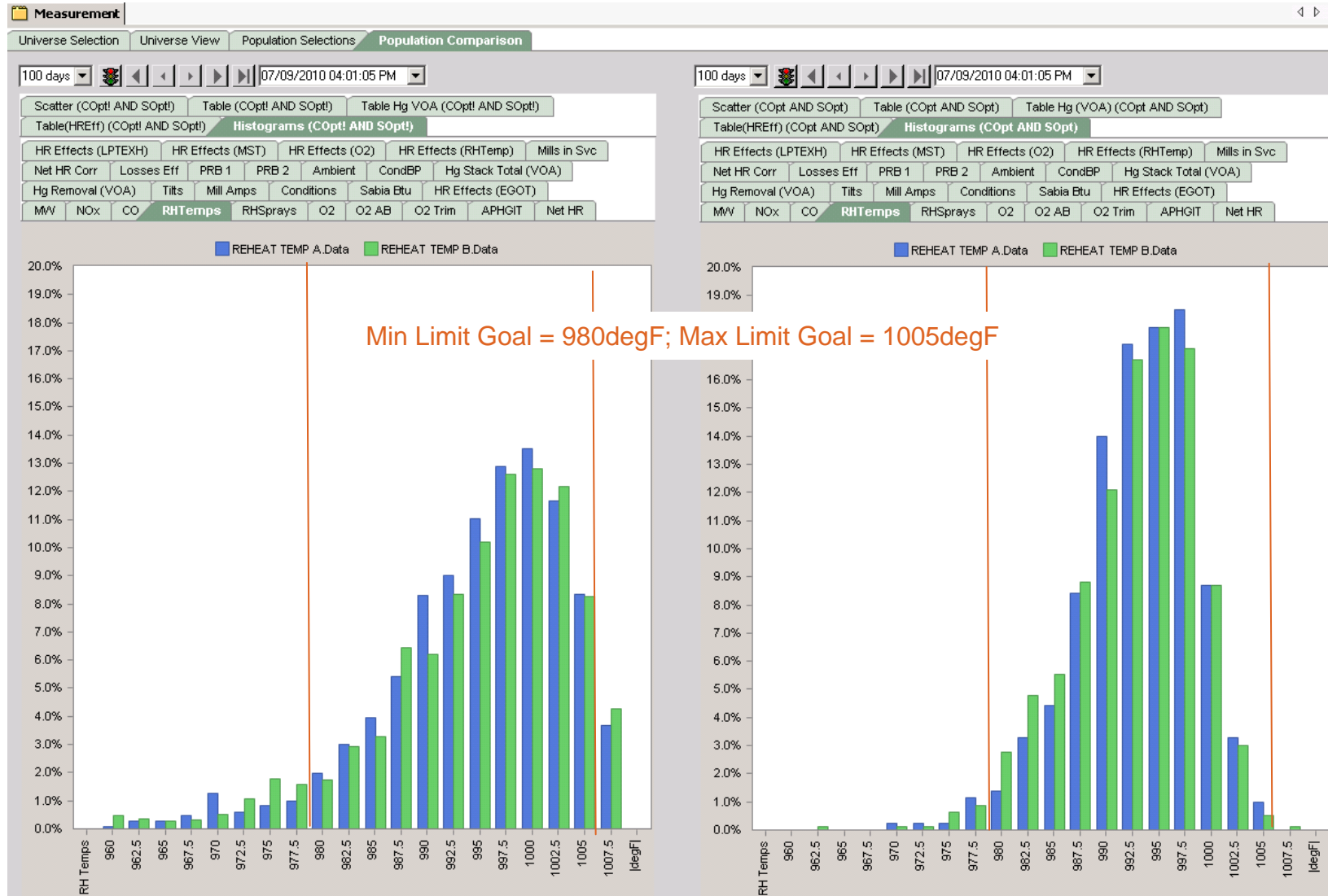


O2 A and B OFF(Left) vs. ON(Right) populations

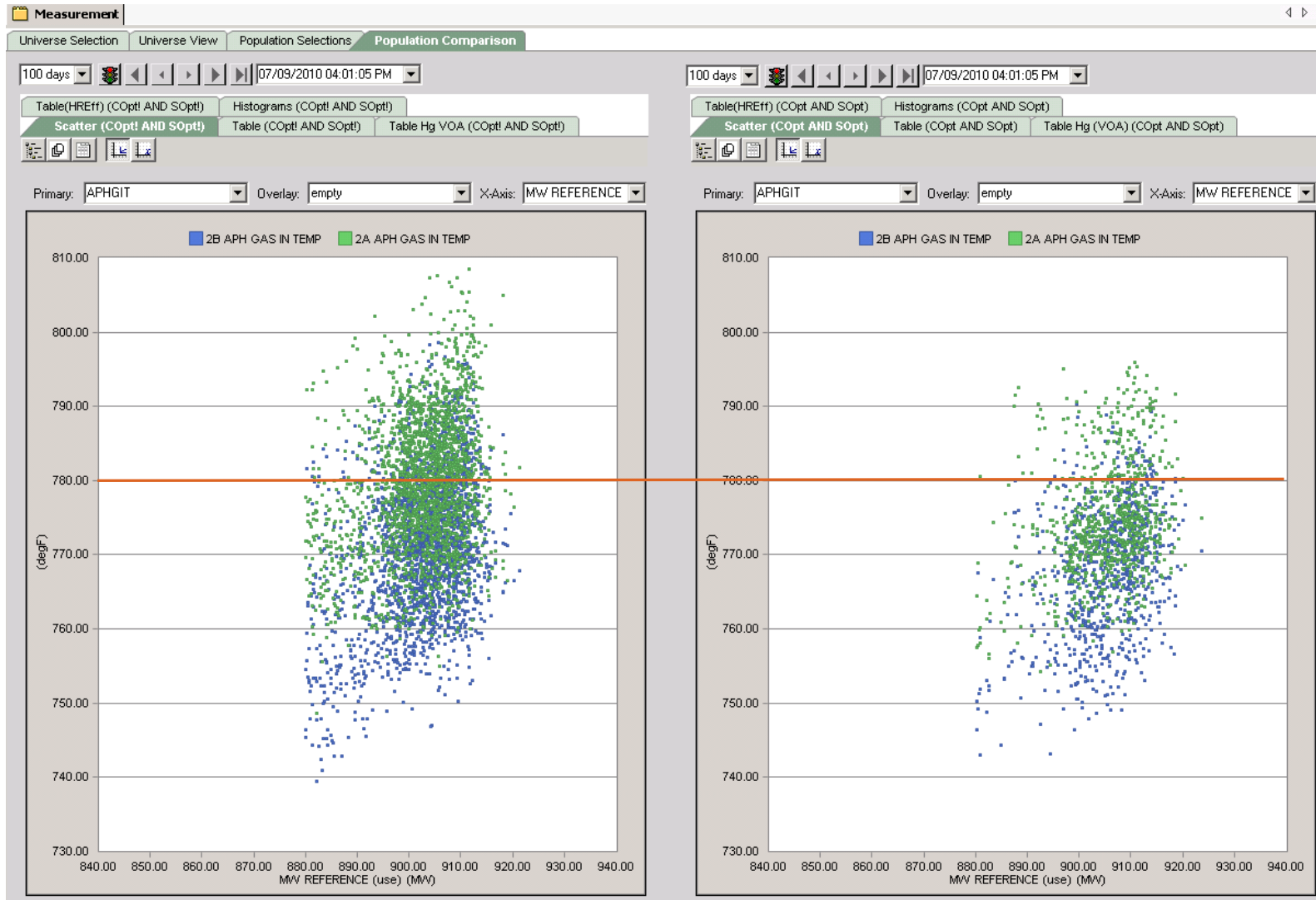
# RH Steam Temps



# RH Steam Temps – Alt View

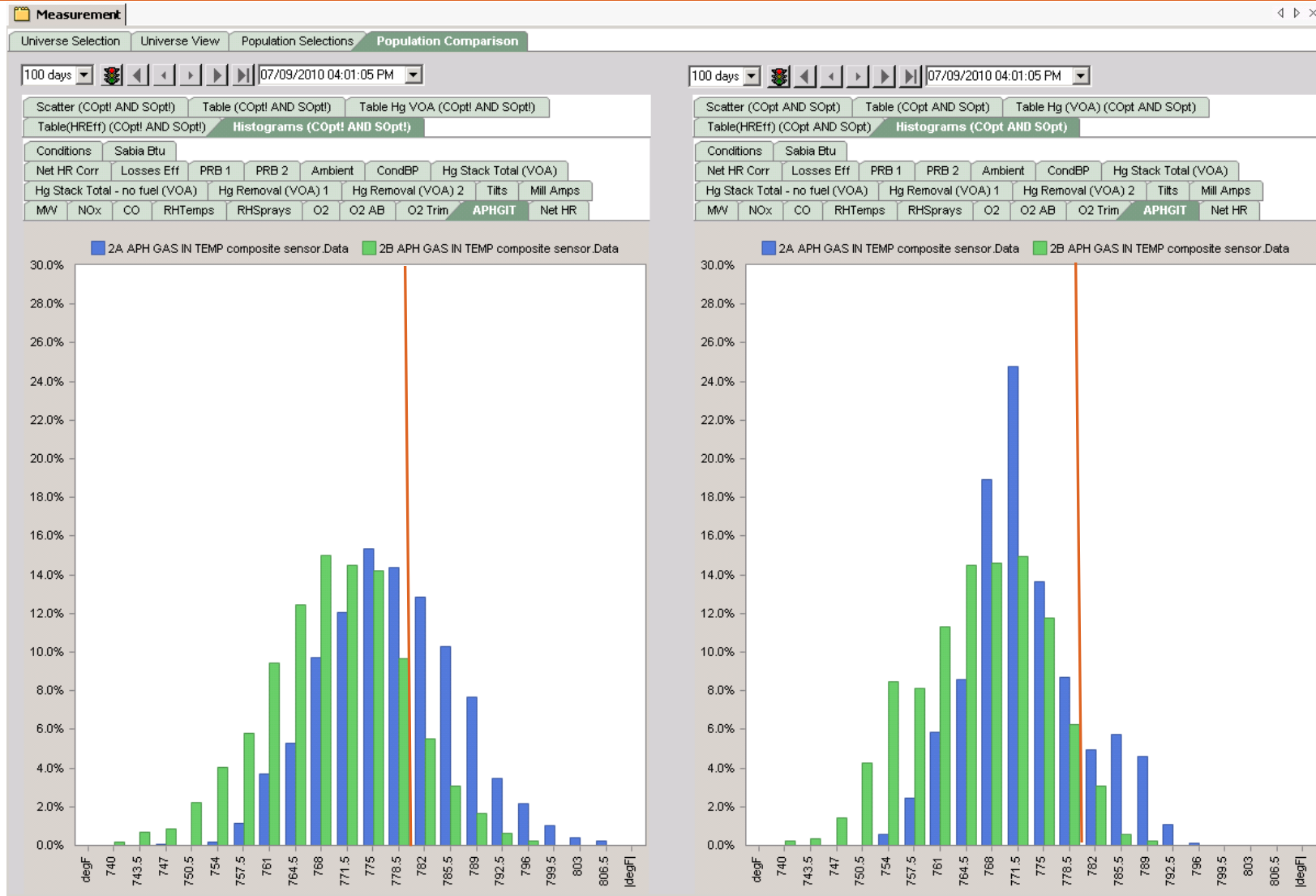


# Air Preheater Gas Inlet Temp

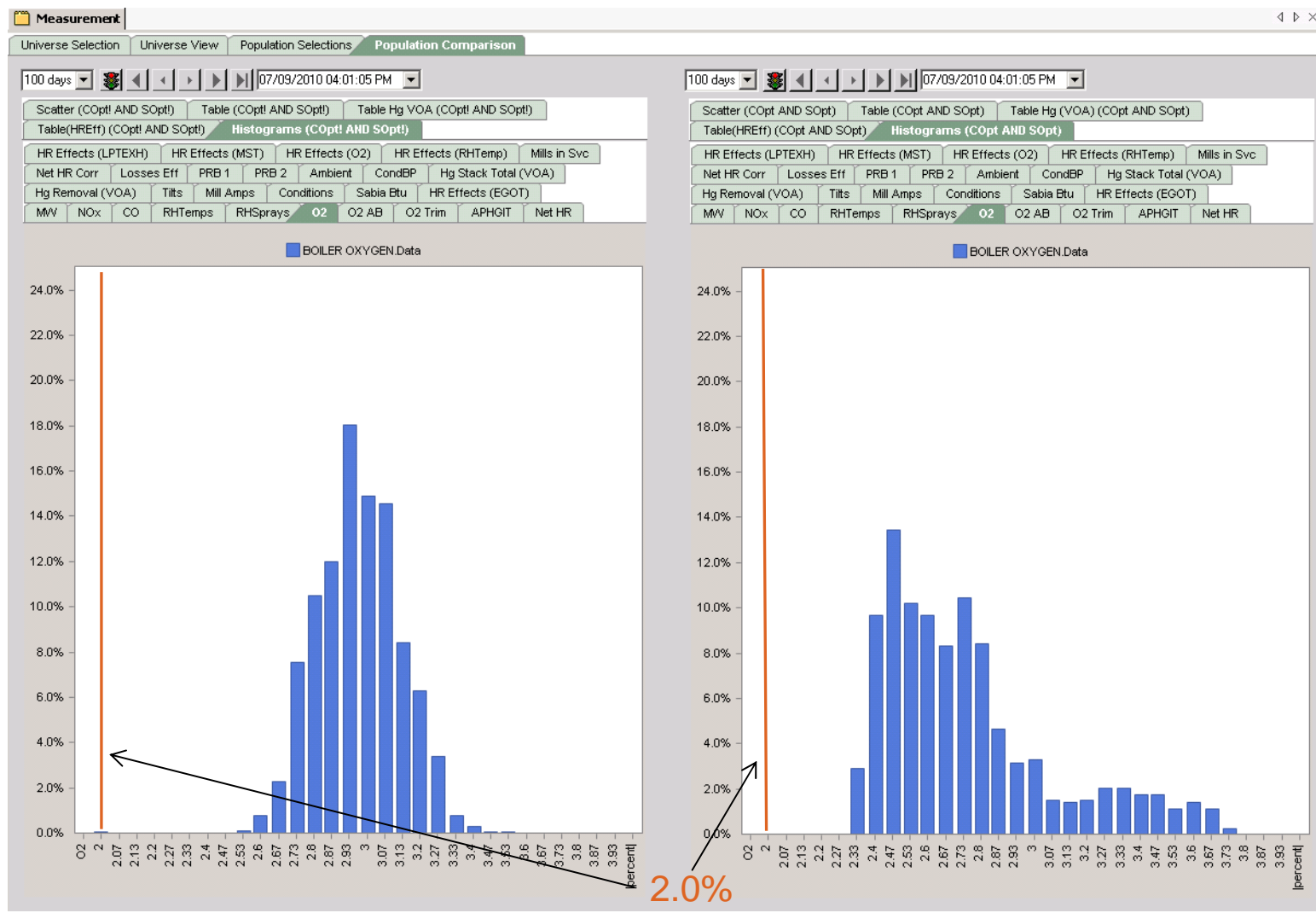


Air Preheater Gas Inlet Temp/Economizer Gas Outlet Temp OFF (Left) vs. ON (right)

# Air Preheater Gas Inlet Temp Alt View

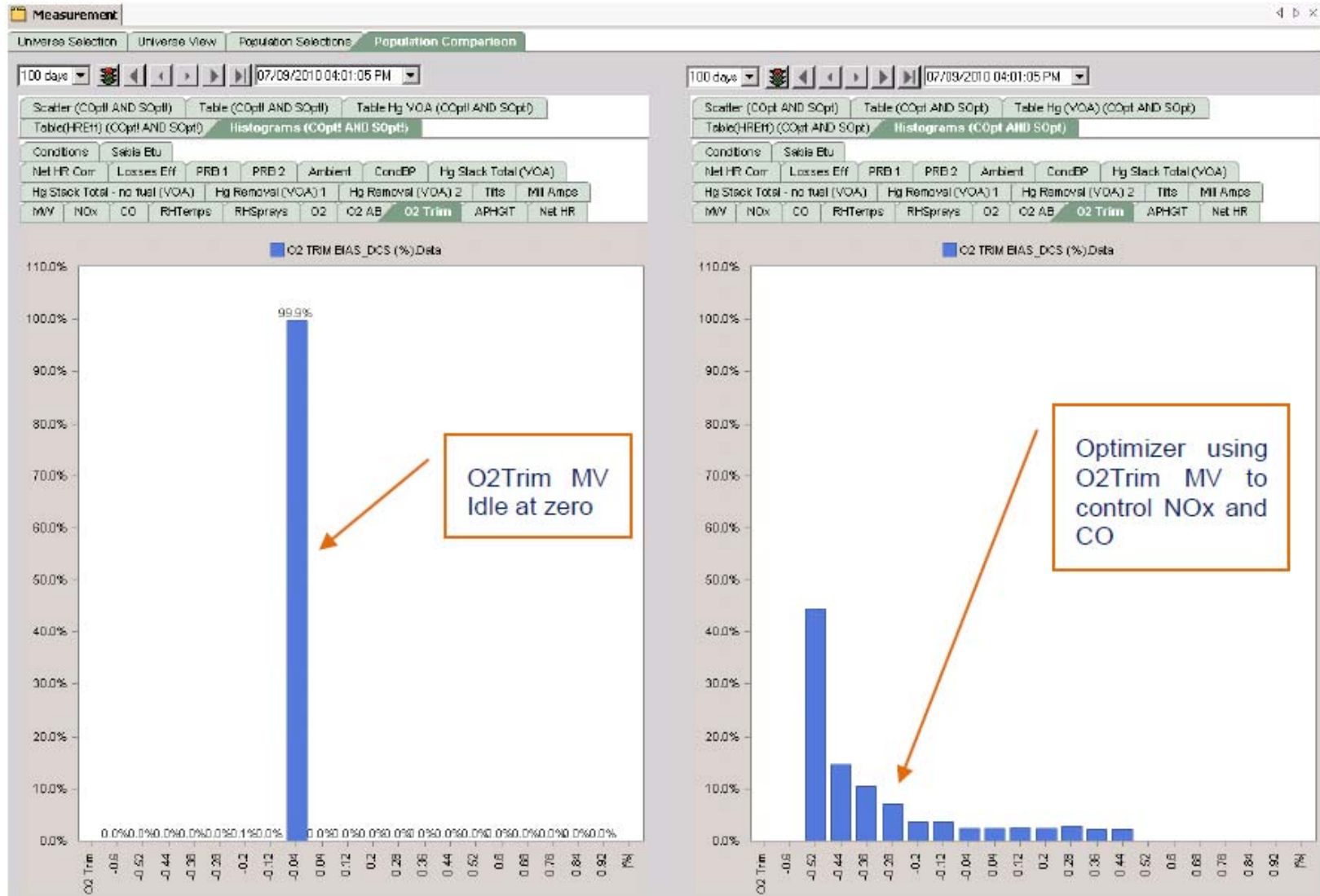


# Boiler O2 OFF vs ON

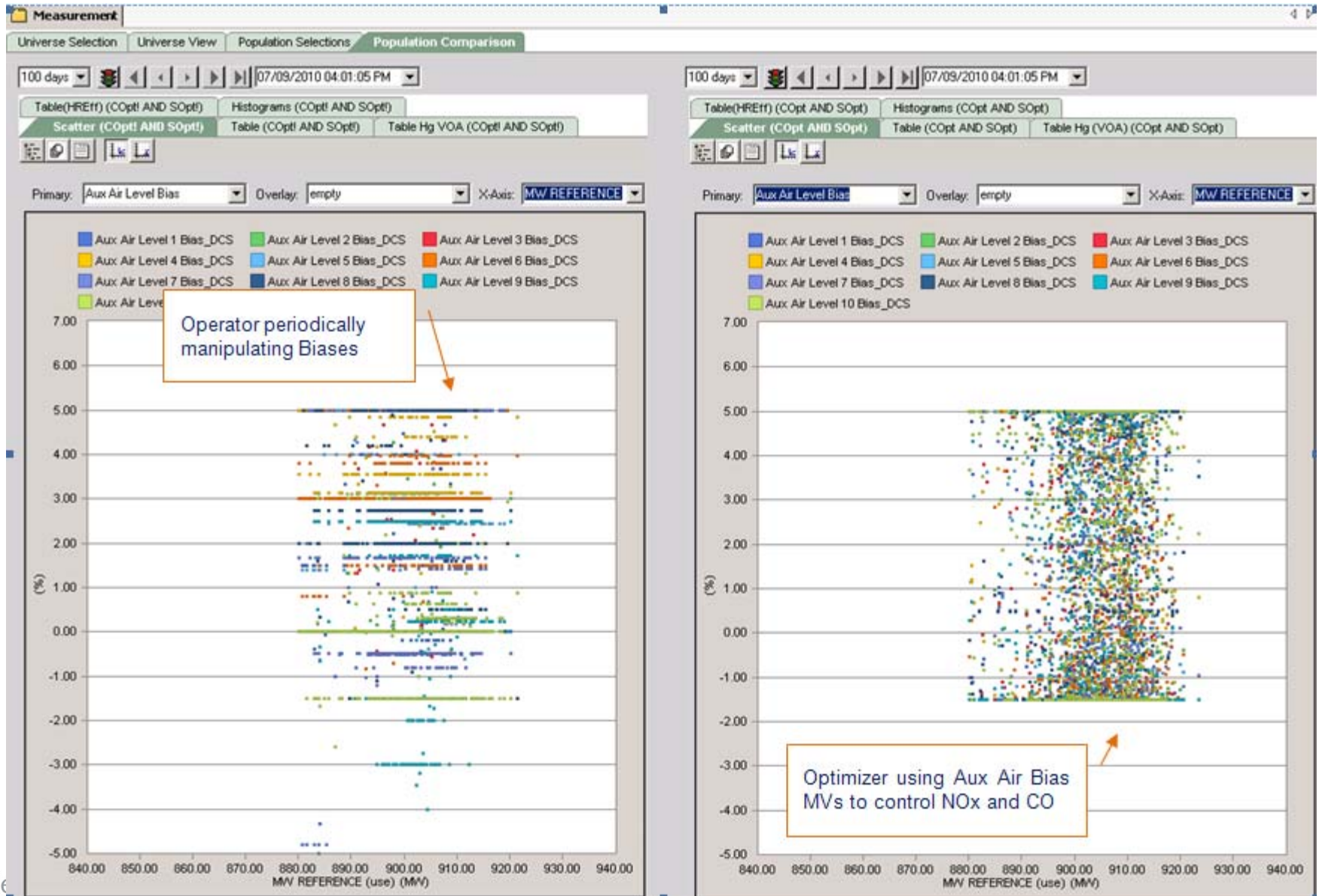


Boiler O2 OFF(Left) vs. ON(Right) populations  
 MW>880, 3/31/10 - 7/9/10  
 "Minimum limit" objective of 2.0%

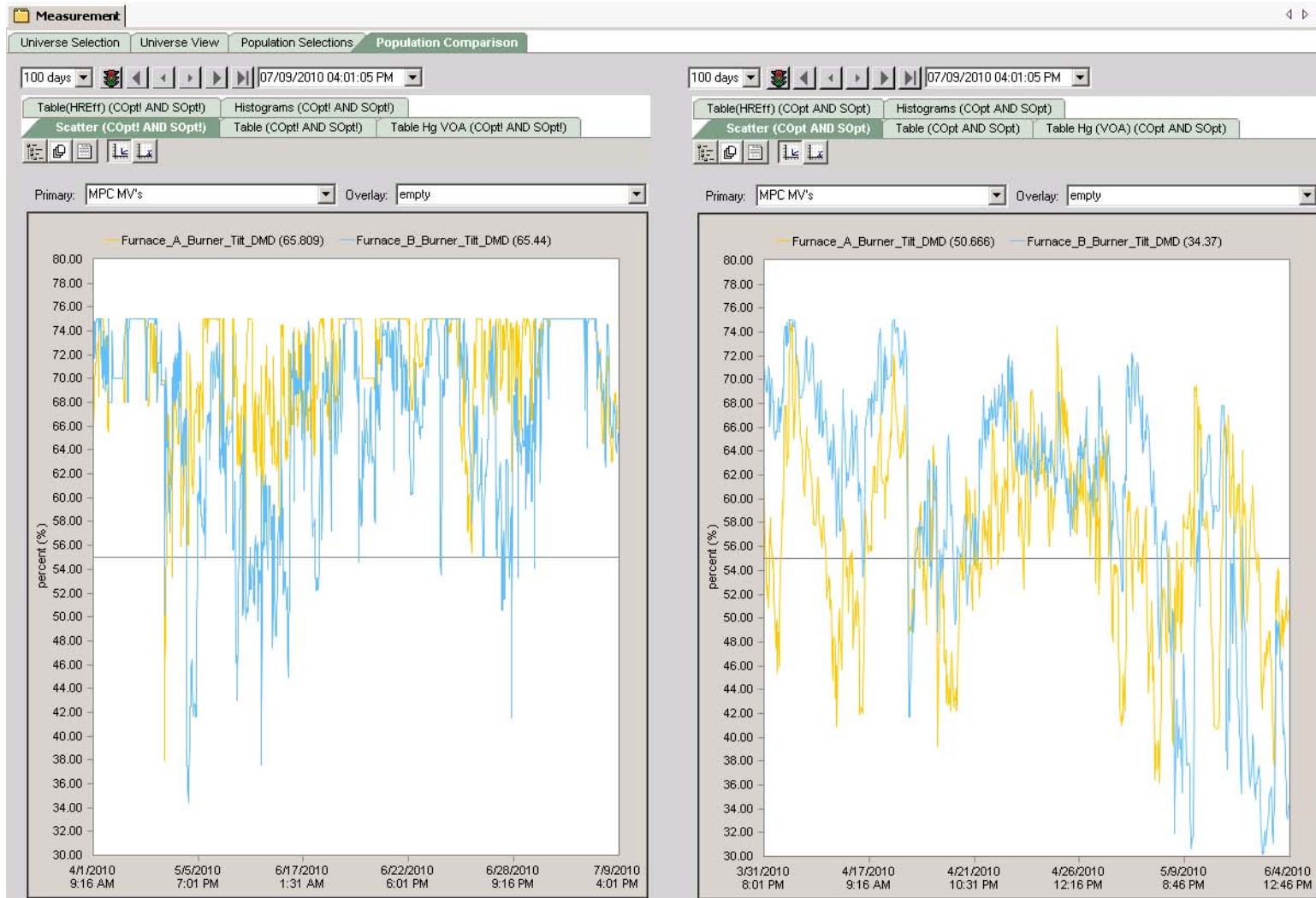
# MPC Controlling O2 Trim



# Aux Air Damper Biases



# Burner Tilt Demand

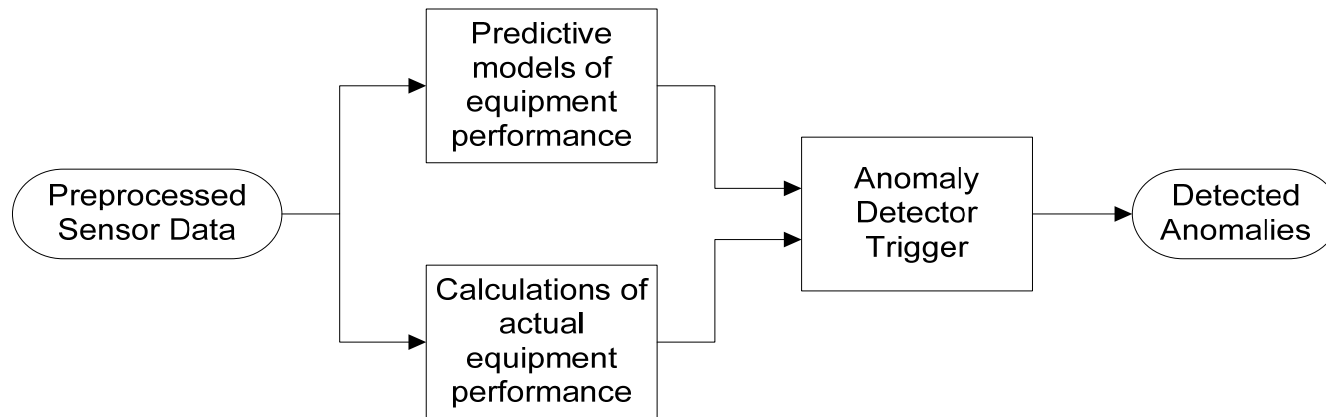


Burner Tilt Demand OFF (left) vs. ON (right), MW>880  
Yellow = Furnace A; Blue = Furnace B

# Advisory Optimizers

- **MaintenanceOpt®:** An early warning system that automatically searches data in real-time for patterns associated with the onset of equipment problems
  - Uses neural network technology to ID anomalies
  - Increases plant availability by preventing forced outages
  - Improves heat rate due to early maintenance of equipment
  - Decreases unscheduled maintenance
  - Improves load factor
- **PerformanceOpt®:** A real-time, proactive performance management tool that constantly searches for and alerts user to opportunities to improve sub-system and process health
  - Real-time heat and material balance for entire plant cycle
  - Calculates performance indices
  - Presents results on graphical user interfaces
  - Identifies performance improvement opportunities
  - Provides alerts associated with performance changes

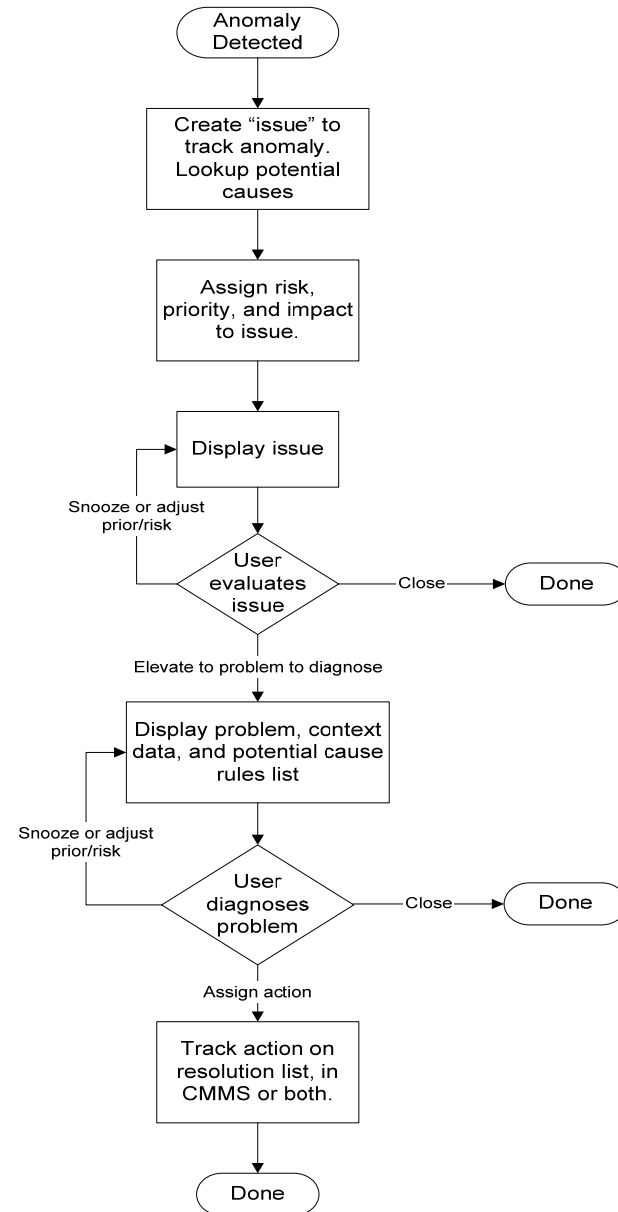
# Problem Identification



- Model is used to predict equipment performance
- Model output is compared to actual performance
- If difference is larger than a threshold, an anomaly is detected

# Diagnosis Flow Chart

A flow chart for diagnosing a potential problem is shown



# Limestone U2 Alerts

- Sample issues/alerts received and addressed:
  - Econ Gas Outlet Temp stratification
  - DCA on 21B FWH
  - Main Turbine Bearing 3X Vibration
  - Main Turbine Bearing 7X Vibration
  - Main Turbine Bearing 8X Vibration
  - 2A BFPT HP Bearing Temp
  - Low oil on primary air fan
  - FWH 21B Drain Valve Problem
  - Condenser Leak
  - Air Heater Basket Damage
  - High O2 Bias
  - EXC-BRG 11 METAL TEMP Increase
  - 15 sensors (e.g. 2A PULV BRG TEMO) showing fixed value
- Key alerts sent via email/PDA & forwarded to NeuCo's Customer Center in Ohio