Neural Network Combustion Optimization
MATS COMPLIANCE

• Optimizing Combustion
  • SOX, NOX, CO, Particulate
  • Furnace Exit Gas Temperature Control
  • Mercury, HCL
Initial /Ongoing Compliance Timeline

Tune-Up timeline for boilers without neural network combustion optimization software (NNCOS)

<table>
<thead>
<tr>
<th>Compliance Date</th>
<th>Compliance Demonstration Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>4/16/14*</td>
<td></td>
</tr>
<tr>
<td>4/16/15</td>
<td></td>
</tr>
<tr>
<td>10/13/15</td>
<td></td>
</tr>
</tbody>
</table>

Perform initial tune-up/boiler inspection

Perform subsequent tune-up/boiler inspections every 36 months from the previous test
COMBUSTION OPTIMIZATION

• LINKED TO DCS
  • Automatic Direct Adjustments
  • Model Predictive Control (MPC)
  • Uses Actual Historical Operating Boiler Performance
CONTROLS

- FUEL AIR RATIOS
- OFA AND LOFA
- DAMPER POSITION
- OPTIMAL BIAS CONTROL
RESULTS

- LOWER EMISSIONS
- LOWER OPERATING COSTS
- LOWER FUEL COSTS
- LOWER REAGENT USE
- LOWER HEAT RATE
- HIGHER AVAILABILITY AND CAPACITY FACTOR
CAN IT BE IMPROVED?

• YES
• ADDING ON-LINE FUEL SAMPLING
• FEED FORWARD INTO NEURAL NETWORK CONTROL
• USES ADVANCED FEED
  • HEATING VALUE
  • MOISTURE
  • ASH MINERAL ANALYSIS
Contact:

Thomas Stringfellow, Senior Engineer
P 303.902.9941
thomas.Stringfellow@naes.com