US Steel - Clairton Coke Works
Largest Coke Plant in Western Hemisphere
12 Coke Batteries (Containing 816 Ovens)
What is (Metallurgical) Coke?
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Coal is heated to approximately 2000°F in the absence of air, driving off the volatile constituents and concentrating the carbon into a fuel suitable for blast furnaces.
Clairton Coke Works
Daily Output

13,000 Tons Blast Furnace Coke
225 Million Cubic Ft$^3$ of Coke-Oven Gas
145,000 Gallons Coal Tar
55,000 Gallons Light Oil
35 Tons Elemental Sulfur
50 Tons Anhydrous Ammonia
Door Emissions
Door Emissions
Pushing Fugitive Emissions
Off-take Piping Emissions
Combustion Stack Emissions
Quenching Emissions
Testing at US Steel shows Particulate Emissions from Quenching are significantly greater than previously estimated.

2006 Emissions Inventory (using AP-42): 882 Tons per year
Emissions based on Tests: 1992 Tons per year
2007 PM$_{2.5}$ FRM Annual Averages by Site (in µg/m$^3$)

- Harrison: 15.2
- North Park: 13.1
- Moon: 13.8
- Lawrenceville: 14.9
- North Braddock: 16.5
- South Fayette: 13.8
- Clairton: 15.1
- Liberty: 18.9
March 2008 Consent Order

 HAVE WE MADE OURSELVES CLEAR YET?

 FINE $$$

 PLANT MGR
$1.2 Billion Upgrade Project

• Replace Six Older Batteries with 2 New
• Extensive Rebuilds of Other Six
• Will be Completed in Two Phases
• 1st Phase Complete 2012
• 2nd Phase Complete 2014
First Phase: “C” Battery

• Replaces Batteries 7, 8, and 9 (192 ovens) with one Larger Unit (84 Ovens)
• Will Employ PROven® Technology
• Lower-emitting Quench Tower
• Enhanced Pushing Emission Controls
- collecting main under suction
- defined and low oven pressure by
- variable flow resistance
- almost zero emissions at oven closures
Low Emissions Quench Tower
Pollution Reductions from “C” Battery

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Tons/Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSP</td>
<td>383</td>
</tr>
<tr>
<td>PM$_{10}$</td>
<td>289</td>
</tr>
<tr>
<td>PM$_{2.5}$</td>
<td>211</td>
</tr>
<tr>
<td>NO$_x$</td>
<td>577</td>
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<tr>
<td>SO$_2$</td>
<td>273</td>
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<tr>
<td>VOC</td>
<td>11</td>
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<tr>
<td>CO</td>
<td>99</td>
</tr>
<tr>
<td>H2S</td>
<td>129</td>
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<tr>
<td>TRS</td>
<td>149</td>
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</tbody>
</table>
Energy Benefits from “C” Battery

• 11% Reduction in Heating Fuel

• ~250 MMBTU/hr in Export Coke Oven Gas
  – Reduces Nat Gas at Other US Steel Plants
  – Reduced CO2 Emissions
“C” Battery Permitting

Jan 1, 2008 - Initial application received

Mar 2-6, 2008 – ACHD personnel inspected Schwelgern coke plant that employed PROven® Technology

May 7, 2008 – Draft Permit made available for public comment

Jun 19, 2008 – Public Hearing held/Comment period closes
Public Comments

- 349 individuals/organizations submitted comments during the period.
- Many made multiple comments
- Comments Resolved and Permit Issued on July 24th
- Currently working on “D” Battery Permit
Summary

• “C” Battery Permit Contains the Lowest Emission Rates of any Coke Battery.

• The PrOven Quench Tower Technology Provides a Feasible Method of Reducing PM At Existing Coke Batteries.

• Despite the Significant Reductions in $\text{PM}_{2.5}$, Attainment in the Liberty/Clairton Area is Not Possible without Upwind Reductions.