Introduction

• This presentation will focus on evaluating existing precipitators ability to meet future regulations.

• The majority of existing ESP’s are not operating under their original design basis.

• Numerous operating ESPs have not been upgraded with modern operating philosophies or equipment.

• Take a holistic approach in evaluating the precipitator in its current operating parameters to permit a viable plan forward.

• Many Important operating parameters have been modified as additional post combustion control equipment like SO3, NOx, and Hg control have been incorporated over the last few years.
Evaluate Existing ESP

- Original Design
  - Fuel, Gas Flow, Efficiency
  - Velocity, Treatment Time, Aspect Ratio
  - Electrical Energization and Sectionalization
  - Rapping Sectionalization and Philosophy
  - Basic Footprint
- Establish baseline performance with computer model
Evaluate Existing ESP

• Current Process
  • Fuel, Gas Flow, Efficiency
  • Any upgrades to ESP?
• Review recent stack tests
• Review/Perform complete Internal Inspection
• Has equipment been added:
  • SCR, FGD, FGC
• Particle Size Distribution
• Review maintenance program
• Quantify performance impacts in computer model calibrating to Stack Tests
Improving ESP Performance

To Achieve Increased Efficiency

• Improve Uniformity of Gas Entering Precipitator
• Increase Migration Velocity of Particle
• Increase Gas Treatment Time/Decrease Gas Velocity
• Reduce Reentrainment from Rappers, Hoppers, etc.

Quantify performance impacts with computer model with each option or combined options
Improve Uniformity of Gas Entering ESP

• Establishes foundation for all other improvements to be maximized

• Internal Inspection
  • Review Flow Patterns on Devices
  • Record Data

• CFD and/or Physical Model Study
Increasing Migration Velocity of Particle

• Voltage and Voltage – Increase Voltage
• Mechanical Limitations
  • Improve Clearances
  • Increase Plate Spacing
• Electrical Limitations
  • Improve Power Supply
  • Improve Electrical Sectionalization
  • Upgrade Discharge Electrodes
• Gas Conditioning in high resistivity cases
Improving ESP Performance

Increase Gas Treatment Time/Decrease Gas Velocity

• Reduce Excess Air
  • Door Gaskets
  • Casing Holes
  • Duct Holes

• Review/Lower Gas Temperature

• Increase Length or Height
Reduce Reentrainment

• Optimize Rapping Sequence
• Increase Sectionalization
• Upgrade Rapper Style
• Review Hopper Evacuation System
• Improve Gas flow in hopper areas
• Gas Conditioning
Conclusion

• No “one size fits all” approach to improving efficiency

• New Technologies and Philosophies are available

• Whether considering a new ESP or upgrading an existing ESP, if properly sized and maintained it will provide for many years of reliable operation in meeting ever increasing regulation.