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

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

Increase 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

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.