

## Introduction

- This presentation will focus on evaluating existing precipitators ability to meet future PM 2.5 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 SO<sub>3</sub>, NO<sub>x</sub>, 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

## To Achieve PM<sub>2.5</sub> 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
- 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

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## **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 PM<sub>2.5</sub> collection
- 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.